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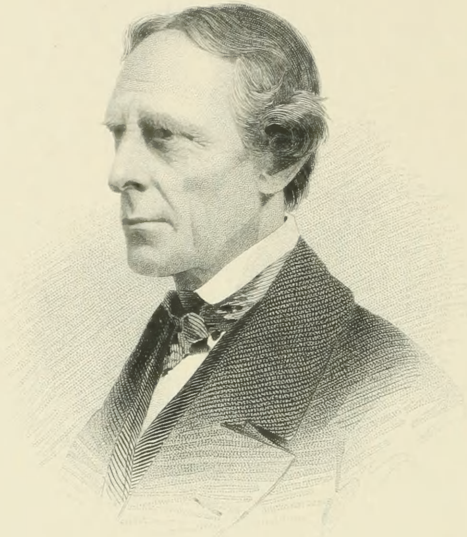

T. Wm. Harris.

OCCASIONAL PAPERS

OF THE

BOSTON SOCIETY OF NATURAL HISTORY.

I

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ENTOMOLOGICAL CORRESPONDENCE

OF

THADDEUS WILLIAM HARRIS, M.D.

EDITED BY

SAMUEL H. SCUDDER.

BOSTON:
BOSTON SOCIETY OF NATURAL HISTORY.
1869.

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PREFACE.

It was the habit of the late Dr. Harris to preserve complete copies of nearly all his letters, written, sometimes, with scrupulous care, in books kept for the purpose; at others, upon odd scraps of paper now scarcely legible from age or handling; these, with the answers received by him, form so rich a commentary upon the history of the earlier period of American entomology, and his other unpublished manuscripts are so filled with interesting scientific facts, that the Council of the Natural History Society commissioned me to collect everything of interest for publication in a single volume. In carrying out the trust confided to me, I have endeavored, first of all, to have the volume represent the author as perfectly as possible, in diction, in illustration, in method, and in the whole choice of material. In the illustrations, I have been fortunate in securing the assistance of Mr. E. S. Morse, who has drawn the wood cuts, and of Mr. S. L. Smith, who has engraved the plates. The authorship of the figures in the body of the work is sufficiently indicated by the context; the illustrations in the plates are mostly from Dr. Harris's drawings, and in all cases from drawings in his former possession; we have endeavored to reproduce these—even when rough or incomplete—as closely as possible, and such a degree of exactitude has been attained as reflects great credit upon the artists. I regret that as great a measure of success has not attended the coloring.

No attempt has been made to bring the volume down to the required style of the present day; rather the reverse, the names of insects being taken from Dr. Harris's manuscript catalogues, mostly prepared between 1820 and 1840; where no names were given, but simply figures referring to his numbered collection, the more modern names have been inserted; but all matter of an editorial character has been enclosed in brackets.

Descriptions of larvæ, etc., have been placed in an appendix, as partial histories of insects which future observers may complete; a few isolated descriptions of insects, including the basis of a monograph of the genus Psocus, have been added, because the colors have been mostly described from living insects; indeed all of these descriptions and the letters themselves are a record of keen and extensive out-door observation, worthy of the author of the Massachusetts Report.

It has also seemed best to insert the original descriptions of insects, including the "Contributions to Entomology," which were published by Dr. Harris in agricultural newspapers, and are now entirely inaccessible save in the city where the papers were issued; the original paging has been inserted for convenience of reference. Finally, I have added, at the suggestion of Dr. LeConte, such passages of importance in the first edition of Dr. Harris's State Report as were excluded by him from the second edition, to afford space for other material, and were accidentally omitted in the posthumous edition, because it was mainly based upon the second. Thus every important paper or fragment, hitherto inaccessible, has been reproduced, excepting the Hartford essay (No. 31 of the list), which could not be reprinted as it appeared without incurring undesirable expense. It is presumed that the articles in horticultural journals are to be found in most libraries which collect such works.

The volume presents rather a heterogeneous collection, but I trust it may be acceptable to entomologists and agriculturists, and prove a not unworthy memorial of Dr. Harris. I deem myself peculiarly fortunate in having secured the introductory sketch by Colonel Higginson; never having had the privilege of seeing Dr. Harris myself, these words renew the vivid picture which I had gained in reading his works. At Colonel Higginson's request I have revised my published list of Dr. Harris's entomological papers, and have added the titles of other papers, mainly collected by Mr. Edward Doubleday Harris. The portrait, from a photograph furnished by the family of Dr. Harris, was engraved by Mr. Halpin, under their supervision.

My thanks are due to the favor of many friends, who have furnished me with manuscripts in their possession, permitted me to publish letters addressed to them, or have rendered aid in other ways. In particular I may mention Mrs. L. W. Leonard, Miss Morris, Drs. LeBaron, LeConte and Pickering, and the late Mr. Herrick. Dr. A. S. Packard and Mr. F. G. Sanborn have also greatly assisted me.

CAMBRIDGE, March 1, 1869.

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MEMOIR

OF

THADDEUS WILLIAM HARRIS

BY

THOMAS WENTWORTH HIGGINSON.

> "Were I to be required to say, in one word, what is the system of Nature, I should say — Variety."
>
> Dr. Harris to Edward Newman, 1844.

One of the ablest of American botanists writes in respect to Dr. Harris, — "Of other genuine naturalists I have read, but he is the only one I ever knew." This is hardly too strong a statement of the loyalty entertained toward this eminent man by those who had the privilege of being his pupils in Natural History. In him there lived for us the very spirit of Linnæus, or whatever name best represents the simplest and purest type of the naturalist. The personal attachment thus won, the healthy influence thus exerted, and the slow and gradual recognition of the merit of his methods, are a form of success more congenial to the temperament of Dr. Harris than would have been any more immediate and superficial applauses.

Thaddeus William Harris was born in Dorchester, Mass., November 12, 1795. He was the son of Thaddeus Mason Harris, D. D., and Mary (Dix) Harris. The elder Dr. Harris was a native of Charlestown, Mass., born in 1768, graduated at Harvard College in 1787, and was librarian of that institution from 1791 to 1793. He left that position to be ordained over the First Congregational Church in Dorchester, where he remained until within a few years of his death, which occurred in 1842. I remember in my boyhood the little quaint old man, bent almost incredibly, but still wearing a hale aspect, who used to haunt the alcoves of the old library in Harvard Hall. It was rumored among us that he had once been appointed private secretary to Washington, but had resigned from illness; and it was known that he was arranging and indexing for Mr. Sparks the one hundred and thirty-two manuscript volumes of Washington's correspondence. He was not without his poetic laurels, too, since it was whispered that he had composed for Mr. Everett's youthful recitation the verses:

"You'd scarce expect one of my age
To speak in public on the stage."

He was, moreover, a learned antiquarian and divine, and had come to Natural History by a strictly professional path; for besides his proper harvest of fifty-eight occasional sermons, and seventeen other publications,[1] he had found time for an elaborate "Natural History of the Bible," which was published in 1820, and long remained a standard work, both here and in Europe. It aimed to describe and identify every animal, plant and precious stone mentioned in Scripture; and must have involved, on many of these points, enough of minute investigation to enlist the whole family in the work. And as Mrs. Harris was at the same period a diligent rearer of silkworms, and supplied herself for ten years with sewing-silk from their labors, it is evident that Natural History must have been a topic of habitual household interest. It is certain that at this time (1820), the younger Dr. Harris began his permanent collection of insects.

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[1] See a list of them in an admirable memoir of the elder Dr. Harris, by N. L. Frothingham, D.D., in the Mass. Hist. Coll., 4th series, II, 130.

He entered Harvard College in 1811, in his sixteenth year, and graduated, with respectable rank, in 1815. One of his classmates describes him as "a timid, sensitive, rather nervous and recluse youth," who was not at that time conspicuous for his love of Natural History. There was a college society, called first the "Lavoiserian," and then the "Hermetic," for the study of Natural Philosophy, and especially of Chemistry. It is very probable that Dr. Harris was inclined to this last study, as he was appointed, some years after his graduation, a member of the Examining Committee in that department. But the college afforded no direct instruction in Natural History at that time, except in the lectures of Prof. W. D. Peck. These were accessible by a special fee, and do not seem to have left a very palatable impression on those who heard them. Dr. Harris, however, attributes to Dr. Peck his first interest in his favorite study. "It was this early and much esteemed friend who first developed my taste for entomology, and stimulated me to cultivate it." This probably refers, however, not to college days but to a renewal of intercourse with the Professor, about 1820. Prof. Peck died two years later, and his manuscripts were submitted for examination to the two Doctors Harris, who reported adversely to the publication, finding them apparently correct and faithful, but a little behind the times. Yet Prof. Peck was reputed a man of real science in his day, and a recommendation of him by Sir Joseph Banks used to be quoted. His only memorial now remains in the baptismal name of one minute insect, the Xenos Peckii of Kirby, which as being at that time the only species of its genus, and the only genus of its order, represented in a certain degree the very aristocracy of science.

After his graduation Dr. Harris devoted himself to the study of medicine, took his medical degree in 1820, and entered on the practice of his profession at Milton, in connection with Dr. Amos Holbrook, whose daughter (Catherine) he afterwards married. Dr. Holbrook was an eminent practitioner in his day, being Vice-President of the Massachusetts Medical Society, and Corresponding Member of several foreign associations. After two or three years, Dr. Harris took an office for himself in Dorchester Village, near Milton Lower Falls. I do not know how far he became really attached to his profession; he never refers to it in his correspondence, and seems to have entirely quitted it after his academical appointment, except when he once took for a few weeks the practice of Dr. Plympton, during the illness of that well known Cambridge physician. It was while he was a resident of Milton and Dorchester that the greater part of his out-door researches in entomology must have been made. Yet he wrote to Prof. Hentz (June 5, 1829) that he "had but very little time to devote to the study of insects." "My leisure moments," he adds, "are principally employed in collecting and preserving such as I can discover, in order to replenish my cabinet of duplicates." For this reason, and from pecuniary anxieties, it is evident that he was quite ready to contemplate a change of residence. For instance, when Prof. Hentz was about taking a professorship in an Alabama university, Dr. Harris was evidently not indisposed to go with him. He wrote March 25, 1829:

> "As to the intimation respecting a professor's chair, I can but repeat what I once mentioned, that my qualifications are not adequate; but if the climate should admit, I could prepare myself for the department of obstetrics or materia medica. Some experience for ten years in the former, and my knowledge of botany, and necessary acquaintance with the manipulation of drugs, would not render it difficult to attain, in a short time, a tolerable knowledge of either of these branches."

Two months later (June 5, 1829) he wrote to the same friend:

> "I am very desirous to learn the issue of your contemplated change of place. Such are the embarrassments and anxieties of my present situation, that your hints in regard to myself would receive serious consideration; especially if the climate, the professional department and the emolument should coincide with my wishes. You may not know that my friends endeavored, some time ago, to procure for me an appointment as librarian at Harvard University, a situation which would have suited me exactly; but unfortunately the place was pre-engaged."

This refers, doubtless, to the appointment of Mr. Benjamin Peirce to the librarianship in 1826. It would appear from this that Dr. Harris had for some time looked with hope to this appointment, which he finally received in 1831, on the death of Mr. Peirce. It would also appear that he found the librarianship attractive for its own sake, and not (as it was perhaps viewed by some of his friends) as a stepping-stone toward a professorship of Natural History. Be this as it may, he accepted the post, and held it during the remaining twenty-five years of his life.

No doubt he looked forward with delight to the change. The librarian's salary was low, but the dignity and permanence of the new post must have appeared in agreeable contrast to the struggle for life of a country physician, whose very acquirements as a naturalist may have impeded his professional career. Then the methodical and accurate habits of Dr. Harris promised to make the daily routine of duty agreeable; he had a genuine love of antiquarian research, though always kept under by the greater attractions of natural science; and he might reasonably hope for many books and some leisure. In both he was disappointed; of leisure he had almost none, and of books no liberal supply. The library at the time of his accession numbered but about thirty thousand volumes, though he left it swelled to sixty-five thousand. Its means of increase were then, as now, very small, and the great cost of works on natural history precluded much investment in that direction.

Dr. Harris was appointed ere long to a quasi-scientific post in the college, in addition to his librarianship. The professorship of Natural History was at this time vacant for want of funds, and Dr. A. A. Gould gave, until 1837, an annual course of lectures on this subject to the senior class. On his resignation, Dr. Harris took his place, and had charge of that department from February 16, 1837, till the appointment of a permanent professor in 1842. I was fortunate enough to be among his pupils. There were exercises twice a week, which included recitations in "Smellie's Philosophy of Natural History," with occasional elucidations and familiar lectures by Dr. Harris. There were also special lectures on Botany. This was the only foothold which Natural History had then secured in what we hopefully called the "university." Even these scanty lessons were, if I rightly remember, a voluntary affair; we had no "marks" for attendance, and no demerits for absence, and they were thus to a merely ambitious student a waste of time, so far as college rank was concerned. Still they proved so interesting that Dr. Harris formed, in addition, a private class in entomology, to which I also belonged. It included about a dozen young men from different college classes, who met on one evening of every week at the room where our teacher kept his cabinet, in Massachusetts Hall. These were very delightful exercises, according to my recollection, though we never got beyond the Coleoptera. Dr. Harris was so simple and eager, his tall, spare form and thin face took on such a glow and freshness, he dwelt so lovingly on antennæ and tarsi, and handled so fondly his little insect-martyrs, that it was enough to make one love this study for life, beyond all branches of Natural Science, and I am sure that it had that effect on me.

As one fruit of these lessons, several of us undertook during the following year to arrange for the Harvard Natural History Society its collection of insects, then very much augmented, and only partially arranged by my predecessor in the Curatorship of Entomology, Henry Bryant, since well known to the world of science. This task kept us in contact with Dr. Harris; we had the aid of his cabinet in identifying the species; but the more we used this ready assistance, the more profound became the wonder how Dr. Harris himself had identified them. There were no manuals, no descriptions, no figures accessible to us; even in the college library there were only a few books on tropical insects, and a few vast encyclopedias, which appeared to hold everything but what was wanted. It seemed as if a special flight of insects must have come to Dr. Harris from the skies, all ready pinned and labelled. Older heads than ours were equally perplexed, and the mystery was never fairly solved until after the death of our dear preceptor, and the transfer of his cabinet and papers to the Boston Society of Natural History.

It was then apparent by what vast labor Dr. Harris had compiled for himself the literary apparatus of his scientific study. A mass of manuscript books, systematized with French method, but written in the clearest of English handwritings, show how he opened his way through the mighty maze of authorities. First comes, for instance, a complete systematic index to the butterflies described by Godart and Latreille, in the Encyclopédie Méthodique. Every genus or species is noted, with authority, reference and synonymes; the notes being then rearranged alphabetically and pasted into a volume — perhaps three thousand titles in all. This was done in 1835.

Then comes a similar compilation of the Coleoptera from Olivier; twenty foolscap pages, giving genus, species, locality, and even measurements, to the fraction of an inch. Then there are three manuscript volumes containing an index to the four volumes of Cramer's "Papillons Exotiques"; one devoted to Stoll's "Supplement," and two to Hübner's "Exotische Schmetterlinge." For Drury's "Illustrations of Natural History" there are two of these elaborate indices, made at different periods; one based on the original edition in 1770–3, and the other on Westwood's reprint of 1837. So beautifully executed is all this laborious work, that it is still as easily accessible as print, though the earlier sheets are yellow and torn. The Natural History Society thus possesses not merely the results of Dr. Harris's researches, but the very tools which he himself forged for their prosecution.

This immense preliminary labor always brings with it some compensation to the isolated explorer, in the thorough drill it implies. "Writing maketh an exact man." But the person who will undertake such labor is generally exact by nature, and Dr. Harris, at any rate, needed no such drudgery to fit him for the higher work of science. Yet there is an inestimable moral in his labor for our younger generation of *savans*, and the saying of Rivarol that "genius is only great patience," had never a better illustration.

In this destitution of books and cabinets, there was another compensation which gave to Dr. Harris a more practical satisfaction. The conditions of a new country, implying these drawbacks, imply also a great wealth of material. In older countries it is rare to discover a new species; it is something to detect even a new *habitat*. But these lonely American entomologists seem, as one reads their correspondence, like so many scientific Robinson Crusoes, each with the insect-wealth of a new island at his disposal. They are monarchs of all they survey. With what affluence they exhibit their dozens of undescribed species; with what autocratic power they divide and recombine genera! How ardently writes Hentz to Harris, "Oh! why must we live at such a distance from each other? What pleasures we might enjoy together." Or, "Mourn no longer for the singleness or solitude of your Amphicoma vulpina! I have found another." Yet they were richer for the loneliness, and perhaps it was better that Massachusetts and Carolina, even in scientific jurisdiction, should remain at a reasonable distance. Had these students shared one entomological region, they would have had less wealth to interchange.

Nothing among the papers of Dr. Harris contains so much of his scientific biography as a letter written by him to Dr. D. H. Storer of Boston, from which I shall therefore take ample extracts.

CAMBRIDGE, Nov. 2, 1836.

Dear Sir:—

Your kind note will cause you the trouble of reading a long answer, if indeed you can spare the time to do so. My plans are by no means so nearly matured as you seem to imagine, nor indeed is there any very great chance of the object of my wishes being speedily accomplished. The want of a manual of American Entomology struck me very forcibly fifteen years ago, when I was turning some of my attention to the study of insects, and this want greatly impeded my progress. There were then very few persons who paid any attention to Entomology in this country; none of them, excepting Prof. Peck, were then known to me; and the information which I could have gathered from him was suddenly lost to me by his death. Sometime afterwards I became known to Mr. Say through our mutual acquaintance, Prof. Nuttall, and a correspondence was continued, at protracted intervals it is true, between us till his decease. I often urged Mr. Say to prepare a manual which would serve for American insects, as Pursh's Flora and Eaton's Manual did for plants, and he assured me that he was collecting materials for the purpose. The describing of an immense number of new, or supposed new species, occupied all the time that he could give to Entomology, and I do not find among his papers anything like an outline or commencement of the desired work.

In the meanwhile I had formed the idea of a local *fauna insectorum*, which should include only the species common in this vicinity, and I began to write descriptions of these species, but found myself embarrassed for the want of books. This difficulty rather increased, or appeared of more importance, as my knowledge of species was enlarged, and I soon found myself in possession of a very large number of insects, which could not, with any propriety, be arranged in any of the genera described in my books. To supply myself with all the works necessary for determining these species and reducing them to their proper genera, required a much larger sum of money than I could command, and I have been compelled to wait even till this time without having my wants in this respect supplied. In the meanwhile some of my descriptions were published in the "New England Farmer," and the series would have been continued there if I could have hoped to excite any interest in the science among those who had the power, if not the inclination, to aid it.

The lectures which I was called upon to deliver before the Natural History Society in Boston, gave a different direction to my studies for a while; but about that time I wrote an introduction, or rather made something like a systematic abstract from the scientific part of Kirby and Spence's Entomology on the subject of the external anatomy, transformations, and different states of insects; which I supposed it would be necessary to prefix to my local fauna. Additions to this and to the descriptive part of the contemplated work have been made at subsequent periods, but still a large part of the labor remains to be done. I have no idea how large a book it would make when finished, nor do I see any prospect of my being able at present to finish it, and indeed I have nearly abandoned all hope of bringing it to a successful termination.

The difficulties met with, at length led me to think of some means of making Entomology popular, and I looked to the young as the proper subjects to begin with. With the hope that by exciting a taste among children for this branch of natural history, the parents might become interested also, I have rewritten my introduction in plain and simple language, divested as much as possible of all hard words, and intend to add to it brief descriptions of some of our most common insects. This you may think is small business, but I hope it may at least be useful and entertaining to those for whom it is intended.

Dr. Pickering of Philadelphia some months ago urged me to undertake a synopsis of American insects, and said so much on this subject that I was induced to take his proposition seriously into consideration. I then wrote to him that if he would examine Say's insects for me, and answer such enquiries as I might find it necessary to make respecting the species contained in his cabinet, I would undertake to make "a descriptive catalogue of the insects named in the second edition of Prof. Hitchcock's Report on the Geology, etc., of Massachusetts," but I could promise nothing more; for I was determined not to undertake to describe any insects but those which I had before my own eyes. Hereupon Dr. Pickering obtained leave of the Academy of Natural Sciences to send me the whole of Say's collections, only stipulating that I should put them in good order, and return them in a condition to be preserved after I had examined and arranged them. They arrived about the middle of July; but on examination were found to be in a deplorable condition, most of the pins having become loose, the labels detached, and the insects themselves without heads, antennæ and legs, or devoured by destructive larvæ, and ground to powder by the perilous shakings which they had received in their transportation from New Harmony. This irremediable destruction has in great measure defeated my expectation of deriving benefit from examining the specimens and comparing them with those in my own collection, and in that of Prof. Hentz. . . . .

Mr. Hentz's collection of insects is a most capital and valuable one; it proves on examination to be *far better than I had anticipated*. I am sorely disappointed and mortified in not having been able to raise subscriptions enough to pay for it, and for the beautiful and useful works of Olivier and Voet which accompanied it.

In spite of the closing sentence of this letter, it appears that the books and cabinet of Professor Hentz were finally paid for (the price being $1,350), though mainly through the personal efforts of Dr. Harris. Professor Hentz was of French birth, but American by adoption, and it is surprising to find that his name does not occur in our encyclopedias, except in connection with his wife, well known as a novelist. He has not even the meagre mention which these works assign to those other pioneers of American entomology, Say and the elder Leconte. They, with Melsheimer, were the early compeers of Dr. Harris, whether they were or were not his peers; while his chief aid in collecting seems to have come from his friend and classmate, Rev. L. W. Leonard, of Dublin, N. H. In truth, the number who seriously applied themselves to this science, in those days, might almost have been counted on one's fingers. His foreign correspondence, when it came, gave more substantial assistance, and I especially remember the zeal aroused in Cambridge by the visit of Mr. Edward Doubleday.

Yet the society of accomplished foreign naturalists perhaps made Dr. Harris feel his own loneliness the more. He writes (Sept. 23, 1839) to Mr. Doubleday:

> "You have never, and can never know what it is to be alone in your pursuits, to want the sympathy and the aid and counsel of kindred spirits; you are not compelled to pursue science as it were by stealth, and to feel all the time, while so employed, that you are exposing yourself, if discovered, to the ridicule, perhaps, at least to the contempt, of those who cannot perceive in such pursuits any practical and useful results. But such has been my lot,—and you can therefore form some idea how grateful to my feelings must be the privilege of an interchange of views and communication with the more favored votaries of science in another land."

Dr. Harris prepared his catalogues of insects as laboriously as he made his indices of books. They were made on the plan of the card-catalogues now used in libraries, upon uniform pieces of paper, three or four inches square, which he afterwards tied in bundles, and carefully labelled. Each card contained the name of the insect with synonymes and authorities, and the number it bore in his catalogue,—but no description. Mr. Say's collection was catalogued by Dr. Harris in the same manner. Most of this sort of work was apparently done in 1837, and all these manuscripts are in possession of the Boston Society. This institution also holds copies of almost all his entomological letters, transcribed with a neatness and clearness peculiarly his own.

His entomological cabinet,—of which he wrote to Mr. Westermann, February 22, 1842, "My collection is not only the best, but the only general one of North American insects in this country,"—is now in possession of the same association. He wrote of this cabinet to Mr. C. J. Ward of Ohio, March 8, 1837, as follows:

> "My object in making a collection, and for this purpose asking the aid of my friends, has not been merely personal gratification; it has been my desire to add something to the cause of science in this country. . . . . . Even should death surprise me before the results of my labors are before the public, I shall leave an extensive, well arranged and named collection, which, from the care bestowed upon it, will be in a condition for preservation, and will remain as a standard of comparison when I am gone. You will judge of the importance and value of such a collection when I assure you that Mr. Say's cabinet does not contain one half of the species which he has described; of the insects in it, many are without names, and all more or less mutilated, and so badly preserved that most of them are now absolutely worthless."

The value thus claimed for this collection is not too great. The delicate and systematic care with which Dr. Harris preserved his insects has secured for them a permanent usefulness. It is well known that no class of specimens in Natural History requires such watchful pains. Almost all his American insects remain labelled and arranged as he left them, thus fixing firmly and indisputably every step he made in their classification. His foreign collection was almost ruined before it came into possession of the Natural History Society, and that of Prof. Hentz was long since almost totally destroyed.

Yet with all this care in his indoor labors, no man knew better than Dr. Harris that the best work of a naturalist must be done out of doors. He had few leisure hours, and even the blessed summer vacation must be largely devoted to the annual examination of the dusty library. But his minute observations on insect-transformation still remain something extraordinary, and many an experienced entomologist has wondered how or where Dr. Harris traced from the egg the varied forms of some little insect which others hardly knew in its completeness. His rare skill with the pencil aided him in this work, as in his studies of classification. As he learned to classify butterflies by drawing the nervures of their wings, so he fixed by copying each successive stage of development. His excursions, too, though rare, were effectual; he had the quick step, the roving eye and the prompt fingers of a born naturalist; he could convert his umbrella into a net, and his hat into a collecting-box; he prolonged his quest into the night with a lantern, and into November by searching beneath the bark of trees. Every great discovery was an occasion for enthusiasm, and it seemed the climax of his life when he found for the first time, on August 5, 1840, the larvæ of the southern butterfly, Papilio Philenor, on a shrub in the Botanic Garden.[1] He had previously written of it to Hentz (Feb. 18, 1838), "this insect must belong to a type of which there is no other in the United States." I very well remember that he gave me one of his few specimens, and when I deposited the lovely butterfly in the cabinet of the Harvard Natural History Society, I felt as if I had founded a professorship.

But the zeal of Dr. Harris was not confined to entomology — it extended to all branches of zoölogy and to botany too. Indeed this was his favorite study next to that of insects, and he left in manuscript an elaborate monograph of the natural order Cucurbitaceæ. I remember the perennial eagerness with which he urged upon us, each spring, to rediscover the Corallorhiza verna in a certain field near the Observatory. It had been found there once, and once only, by my classmate, Dr. Woodward. It had certainly been found — and yet it seemed improbable that it should have been found, and it never was found again — and Dr. Harris's eyes would always kindle when the little flower was mentioned, and he would ponder, and debate, and state over and over again the probabilities and improbabilities, and discuss the possibility of some error in the precise location, and draw little plans of that field and the adjoining fields, and urge us on to the pursuit or cheer us when drooping and defeated, until it seemed as if the quest after the Holy Grail was a thing insignificant and uninspiring compared with the search for that plain little orchid. This was the true spirit of the observer, — appreciation of the unspeakable value of a fact.

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[1] See p. 147 following.

Still the certainty remains that for all productive purposes of Natural History the last fifteen years of his life yielded constantly less and less. Genius works many miracles, but it cannot secure leisure for science to a man who has twelve children, no private means, and the public library of a University to administer. As the library grew larger, his opportunities grew less, and it is pathetic to read in his correspondence the gradual waning of his hopes of release.

He wrote (Nov. 10, 1837) to Dr. Charles Zimmermann, of Columbia, S. C. (the italics being his own):

> "I look forward to all your future sendings with much hope, and beg that you will favor me with such insects as you can conveniently part with, as soon as possible. At present I may not have it in my power to make *full and adequate returns*: but *the time may come* when I shall no longer be so closely confined to one spot, and so much absorbed with other duties; and when that time does come, I mean to go forth into the neglected parts of this and the neighboring States, and collect largely of the insect treasures contained in them. Then you shall share fully and freely of my gatherings."

These eager visions faded, and he wrote five years after (Nov. 3, 1842), to Mr. E. C. Herrick, librarian of Yale College, this final abandonment of the hopeless attempt to be librarian and naturalist at the same time:

> "The business of the public library of the University takes up nearly all my time, and unless something more favorable turns up, I shall not be

able to pursue the study of natural history any longer. I hope that some others may be found to take up, follow and finish the history of American insects;—hosts of which are now waiting for a biographer to name and describe their characters."

It is easy to conjecture the circumstance which seemed thus finally to close Dr. Harris's hopes of obtaining leisure for science. The Professorship of Natural History in the University, which had remained vacant for want of funds since 1834, was filled (April 20, 1842) by the appointment of Dr. Asa Gray. During this interval, the duties of the department had been partly discharged by Dr. Harris, and it was inevitable that he and his friends should indulge a hope of his permanent appointment. The matter was the subject of much conversation at the time, and is several times mentioned in his more familiar correspondence. It was fortunate that the very eminent claims of Dr. Gray, and the especial propriety of selecting a botanist to take charge of the Botanical Garden, relieved the appointment from all appearance of discourtesy to Dr. Harris. But all lovers of science must regret that no way was found of securing for its exclusive benefit the maturity of a naturalist so gifted.

In spite of all obstacles, Dr. Harris always contributed very largely to scientific, agricultural and other periodicals, and a catalogue of these papers, more or less complete, is appended to this memoir. But he rarely came before the public for any more extended work. He prepared in 1831 the catalogue of insects appended to Hitchcock's Massachusetts Geological Report. In the condition of American science at that day, it was a work of inestimable value, though his only material compensation was one copy of the Report, and several copies of the Appendix. At a later period he was appointed by the State as one of a scientific commission for a more thorough geological and botanical survey. In this capacity he prepared his "Report on Insects Injurious to Vegetation," first published in 1841, reprinted by himself under the name of "Treatise," instead of "Report," in 1842,—and again in a revised form in 1852. The whole sum received by him, from the State, for this labor, was $175. After his death, the book was reprinted by the State, in an admirable form, with engravings, and it is upon it that his scientific reputation will mainly rest.

It is admitted by all who read this treatise that it is almost a model combination of the strictly scientific spirit with the clearest popular statement. In the words of a younger entomologist, writing of Dr. Harris:

> "He was remarkably exact in his observations, careful in his statements, and painstaking in a high degree. His generalizations have stood well the tests of subsequent research, and a more extended array of facts. He never lost sight of the end at which he aimed; never allowed undue weight to any set of observations, even when they were his own, and never left any thing to conjecture. His insight into nature and relations of affinity, although they might be based upon a meagre series of natural objects, was truly enviable. Conservative in his methods and tendencies, he was nevertheless quite independent, and had a clear, well-balanced and penetrating mind. His acquaintance with American entomology was broader and more exact than that of any one before or since his day, and yet in nothing that he has written do we find him proclaiming his own discoveries."

His later entomological correspondence bore chiefly on the topics covered by this treatise, as he had not the leisure to enter on new ground. There exists, however, a letter to Mr. Edward Newman, which should here be included, both from its personal interest, and from its expression of opinions on general scientific problems. The letter is in acknowledgment of a work entitled "The System of Nature; an Essay," published in 1843 by that eminent naturalist, and by him dedicated to Dr. Harris.

"CAMBRIDGE, Jan. 7, 1844.

"EDWARD NEWMAN, ESQ.,
"No. 9, Devonshire Street, Bishop's Gate, London.

"*Dear Sir:* —

"On the 23d of December I received the beautiful volume which you have done me the honor to dedicate and send to me, and offer you my sincere and respectful thanks for the same. The copies for the Public Library of Harvard University and for the Boston Society of Natural History, were duly forwarded as soon as received.

"I have often read the very interesting letter which you wrote to me some years ago; as well as your valuable contributions to the Entomological Magazine. These, with your "Sphinx Vespiformis," your Grammar of Entomology, and your very ingenious essay on the System of Nature, are full of instruction.

"In a private course of lectures on Entomology given to some of the students of the University, four years ago, I endeavored to explain your system, and made diagrams for the purpose, some of which still remain hanging in the room where our excellent friend, Mr. Doubleday, saw my collection of insects. I have often wished you would combine in one work all that you have published on the classification of insects, and the characteristics of the groups. Your papers on this subject in the Entomological Magazine, with an abridgement of what is contained in the "Sphinx Vespiformis," would form a very useful and acceptable addition to a future edition of your Grammar of Entomology.

"If I cannot give an unqualified assent to all your views, I think them well worthy of attention, consideration and study.

"You have often very happily illustrated what before was obscure, and have pointed out some striking resemblances, or affinities, as it is the fashion to call them. You have proved to my satisfaction the centrality of certain groups or types of form, combining some of the characteristics of the surrounding groups, together with a character peculiarly their own. This, it appears to me, must be the key to affinities, if such exist. That there are really seven great and perfectly natural groups of insects, and that they approach each other, as you have represented, appears undeniable. Divide any one of them, and the parts lose their relative value when compared with the other groups. Whether there ever were, or ever will be, other equally natural groups of insects, and—if so—how they can be connected with your circle, is more than I can tell. It seems to me, however, upon taking a more extended view of nature, that living bodies are infinitely varied in structure, and were I to be required to say in one word, what is the system of nature, I should answer, variety. We see only a part of the series, the beginning and the end are lost to our view—we know only in part what is—we know but little of what has been, and we know nothing of what is to be. And yet to form a perfect, philosophical system, or rather to trace out the whole plan of the Creator, we should have at once before us all the living beings that ever have been, and ever will be created. Hence all our attempts to discover a natural system, either in Zoölogy or Botany, must fall far short of perfection.

"Allow me again to make my acknowledgments for the unmerited honor that you have conferred upon me,—and be assured that such notice from one for whose valuable contributions to science I have a high respect, is a source both of pride and of pleasure to

"Your friend and servant,

"T. W. Harris."

But if this letter shows the maturity of his scientific judgment, another, written in the same year, shows his overtaxed physical condition. It is addressed (January 30, 1844) to Mr. Doubleday of the British Museum, the favorite entomological correspondent of his later years:

"Your letter shows me what I feared would be the case, that the cares and responsibilities of your situation absorb most of your time, and undermine your health. My friend, be warned in season, if it be not now too late, by my own sad experience, that the unremitting devotion to duties in a public establishment will wear out body and spirit, will deprive you of leisure, of necessary exercise and relaxation, and will give you in return only a petty compensation, at the expense of your time, health and happiness. Your account of your own labors, cares and anxieties in the museum, seems to me an echo of my own in the public library of the University, which now for two years has added a double burden to my before overtaxed powers of mind and body."

In spite of this habitual overwork, sometimes leading to nervous exhaustion or severe headaches, the general health of Dr. Harris was good. It was a rare thing for him to be confined to the house by illness. During his later years he had occasional attacks of pain in the chest, which he thought to be pleurisy. On the 9th of November, 1855, he was attacked with pleurisy of the right side, followed by an effusion into the cavity of the chest. This confined him to the house, which he never again left, although it did not prevent him from receiving the visits of his friends. During the month of December he suffered mainly from shortness of breath and weakness; later he had an affection of the veins of the legs, followed by their obstruction. Early in January of the following year, he had a sudden faintness, from which he hardly rallied, and which he himself thought at the time would be fatal. He died at last from a similar attack on the 16th of January, 1856, at the age of sixty. An hour before his death he had a conversation on library affairs with his assistant and successor, Mr. John L. Sibley,—and then expired, in the act of rising from his bed. The disease proved to be pleurisy, with what is known as *embolism.*

The life of Dr. Harris, with whatever disappointments and drawbacks, must not be regarded as a sad one. It was certainly a great loss both to himself and the world that the maturity of his powers should have been given to anything but Natural History. Yet the work which was assigned him was not uncongenial, except by comparison. As he could not be wholly a naturalist, he found enjoyment in being a librarian. His father had held the same office, almost to the year of his own birth, and he seemed born with the librarian's instinct for alcoves and pamphlets and endless genealogies. He had in preparation a very elaborate genealogical history of the Mason family, and was often consulted as an expert upon such matters. He kept his official records with exquisite accuracy, and described his methods to other librarians as lovingly as if he were describing a chrysalis. To that indeed the College library of those days had much resemblance, nor has its period of active development yet come.

His official cares thus brought their own compensation, and this was yet more true of that home-life which no man ever enjoyed more, though its solicitudes and blessings, as usual, multiplied together.[1] Constant references and expressions in his letters, in regard to his own family and those of his correspondents, show his affectionateness of disposition and delicate sympathy. I mention this the more, because it may be that the engraving in this volume would give a wrong impression, in this respect, to those who did not know Dr. Harris. There is a certain rigidity about it which belonged to his face, perhaps, when in repose,—the result partly of overwork and partly of the frequent headaches which, in his own words, "kept him always thin." But the moment he spoke, his face had the kindest smile and such a play of sensitive expression that I cannot possibly associate with it anything like sternness.

The eldest son of Dr. Harris (William Thaddeus) was a schoolmate of mine, and had a career somewhat remarkable for the energy and perseverance shown by him in struggling against severe physical infirmities, and preparing himself for Harvard College, where he graduated in 1846, at the age of twenty. In him the antiquarian tastes of the family passed to a third generation; he prepared with assiduous labor, while in college, a volume containing the quaint epitaphs in the Cambridge churchyard; he had also prepared for publication a transcript of the still quainter inscriptions of the old Watertown burial-ground, a work soon to be published, under the supervision of his younger brother; he had projected a continuation of "Prince's Chronology," and at the time of his early death in 1854, was already a Corresponding Member of several European archæological societies. He was admitted to the Suffolk Bar a few months before his death, having pursued his legal studies in Cambridge.

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[1] The children of Dr. Harris were as follows:

1. William Thaddeus, b. Jan. 25, 1826 [H. C. 1846], d. unmar. Oct. 19, 1854.
2. Sarah Catherine, b. Nov. 7, 1827, d. Sept. 10, 1828.
3. Harriet Gardner, b. Jan. 2, 1829, mar. Prof. George Phillips Bond of the Astronomical Observatory of H. C., and d. Dec. 12, 1858, leaving issue.
4. Emma Forbes, b. Dec. 16, 1830.
5. Catherine } b. Oct. 2, 1832, } resident of Boston.
6. Charles }
7. Amos Holbrook, b. July 9, 1834, resident of Boston,
8. Clarendon, b. Mar. 24, 1836, resident of Laporte, Ind.
9. Edward Doubleday, b. Sept. 20, 1839, resident of Cambridge.
10. Thomas Robinson, b. June 15, 1842 [H. C. 1863], clergyman of Prot. Epis. Church, resident of Long Island, N. Y.
11. Elizabeth, b. Nov. 1, 1844.
12. Sarah Harriet, b. Sept. 23, 1849.

The scientific portion of the library of Dr. Harris—including about two hundred and fifty volumes—was purchased after his death by John P. Cushing, Esq., of Watertown,—who was also the largest contributor for the purchase of his cabinet and manuscripts, which also became the property of the Boston Society of Natural History. The following description of the library was orally given to the Society by the Curator of Entomology, on its reception:

> "Among the volumes is one containing all the rarer tracts of Say, most of which are extremely scarce; among them his New Harmony pamphlets, one of which (on the Heteropterous Hemiptera of North America) is probably the only copy in this country, if indeed it can be found anywhere else. There is a volume of colored drawings by John Abbot, of the Lepidoptera and Coleoptera of Georgia, presented to Dr. Harris by Edward Doubleday, Esq., of England, containing all the originals of the drawings in 'Abbot and Smith's rarer Lepidopterous Insects of Georgia,' besides many others yet unpublished. Most of the important European works are here,—such as those of Fabricius, Herbst, Dejean, Boisduval, Macquart, Wiedemann, Audinet-Serville, Sahlberg, Coquebert, Schönherr, Gory and Percheron,

Aubé, Laporte and Gory, Westwood, Knoch's 'Neue Beytrage,' and the 'Wiener Verzeichniss'; together with nearly complete sets of most of the publications of entomological societies and entomological periodicals. Some of these are from the library of Mr. Say, and contain a few of his notes; many were once possessed by Prof. Peck, the predecessor of Dr. Harris, and one is from the library of Dru Drury; and nearly all are enriched by copious notes by Dr. Harris."

At a meeting of the American Academy of Arts and Sciences, held February 12, 1856, a series of resolutions was presented by Dr. A. A. Gould, one of which included the following summary of the services of Dr. Harris.

"*Resolved*, That as a bibliographer and an archæologist, in relation especially to the history of our own country, he held a distinguished rank; that as a naturalist he has not been surpassed by any of his countrymen, and has exhibited a patience, thoroughness, and accuracy of observation in the various departments of Natural History, a truthfulness in the delineations, both of his pencil and his pen, and a singular facility in employing language intelligible to the common reader, and at the same time fulfilling all the requirements of science, which render him a model for the interrogator of Nature; and that, through a long life of untiring industry, he has accumulated and published a mass of original observations, of an eminently practical bearing, which have won for him high consideration, both at home and abroad, and will constitute for him an enduring monument."

It appears by the record that "the resolutions were seconded by Professor Louis Agassiz, who added that Dr. Harris had had few equals, even if the past were included in the comparison"; and that Dr. A. A. Gould was appointed to prepare a memoir of the life and labors of Dr. Harris, for publication by the Academy. It is greatly to be regretted that this work was never accomplished.

The steady growth of Dr. Harris's reputation is not due alone to his position as pioneer in American science during its barest period. It has grown because he proves to have united qualities that are rare in any period. He combined a fidelity that never shrank from the most laborious details with an intellectual activity that always looked beyond details to principles. No series of observations made by him ever needed revision or verification by another; and yet his mind always looked instinctively towards classification and generalization. He had also those scientific qualities which are moral qualities as well; he had the modesty and unselfishness of science, and he had what may be called its chivalry. He would give whole golden days of his scanty summer vacations to arranging and labelling the collections of younger entomologists. And it roused all the wrath of which his soul was capable when even a rival was wronged, as when Dejean ignored Say's descriptions, because he had not learned English enough to read them.

I remember his once holding up to us, as the true type of a scientific reputation, that of Robert Brown, supreme among botanists, unknown even by name to all the world beside. More fortunate than Robert Brown, Dr. Harris combined with this high aristocracy of science a peculiar capacity of practical application, and has left a rare example of the scientific and the popular spirit in one.

LIST OF THE WRITINGS

OF

THADDEUS WILLIAM HARRIS, M.D.

1. Upon the natural history of the salt-marsh caterpillar (Arctia pseudermina), with a plate. Mass. Agric. Rep., Vol. VII, No. IV, pp. 322–331, June, 1823.

   (*a*) Reproduced without figures in the N. Engl. Farm., Vol. I, No. XLIX, pp. 385–386, July 5, 1823.

2. Description of four native species of the genus Cantharis. Bost. Journ. Phil. and Arts, Vol. I, pp. 494–502, 1824.

   (*a*) Ditto in the New Engl. Journ. of Med. Surg., etc., Vol. XIII, No. III, pp. 243–250, July, 1824.

3. Caterpillars (Clisiocampa americana). N. Engl. Farm., Vol. IV, No. XLV, p. 354, June 2, 1826.

4. Peach tree insect (Ægeria persicæ). N. Engl. Farm., Vol. V, No. V, p. 33, Aug. 25, 1826.

   (*a*) Reproduced in part in Harr., Entom. Corresp., p. 359.

5. Insects which destroy cocoons of silk worms (Dermestes lardarius). N. Engl. Farm., Vol. V, No. V, p. 33, Aug. 25, 1826.

6. Trees. Abstract of a report on the state of the elm tree in St. James and Hyde Parks, by W. S. MacLeay (with additional remarks). N. Engl. Farm., Vol. V, No. XXII, pp. 169–171, Dec. 22, 1826.

7. Dr. Hunt's insect (Tremex columba). N. Engl. Farm., Vol. V, No. XXVII, p. 211, Jan. 26, 1827.

   (*a*) Reproduced in part in Harr., Entom. Corresp., p. 360.

8. Descriptions of three species of the genus Chremastocheilus. Journ. Acad. Nat. Sci. Philad., Vol. V, pp. 381–389, Feb., 1827.

9. Minutes towards a history of some American species of Melolonthæ, particularly injurious to vegetation. Mass. Agric. Rep., Vol. X, No. I, pp. 1–12, July, 1827.

   (*a*) Reproduced in the N. Engl. Farm., Vol. VI, No. II, pp. 9–10, Aug. 3, 1827; No. III, pp. 18–19, Aug. 10, 1827.

10. Insects on peach trees (Aphides). N. Engl. Farm., Vol. VI, No. L, p. 393, July 4, 1828.

11. Insects (Gastropacha velleda, Ægeria cucurbitæ, Arctia textor). N. Engl. Farm., Vol. VII, No. V, pp. 33, 34, Aug. 22, 1828.

    (*a*) Reproduced in part in Harr., Entom. Corresp., p. 360.

12. The curculio, or worm in fruit (Conotrachelus nenuphar). N. Engl. Farm., Vol. VII, No. XI, pp. 81–82, Oct. 3, 1828.

13. Contributions to Entomology [No. I.]. N. Engl. Farm., Vol. VII, No. XII, pp. 90–91, Oct. 10, 1828.

(*a*) Reproduced in Harr., Entom. Corresp., pp. 337–341.

14. Contributions to Entomology, No. II. N. Engl. Farm., Vol. VII, No. XV, pp. 117–118, Oct. 31, 1828.

(*a*) Reproduced in Harr., Entom. Corresp., pp. 341–344.

15. Contributions to Entomology, No. III. N. Engl. Farm., Vol. VII, No. XVI, pp. 122–123, Nov. 7, 1828.

(*a*) Reproduced in Harr., Entom. Corresp., pp. 344–346.

16. Contributions to Entomology, No. IV. N. Engl. Farm., Vol. VII, No. XVII, p. 132, Nov. 14, 1828.

(*a*) Reproduced in Harr., Entom. Corresp., pp. 346–348.

17. Contributions to Entomology, No. V. N. Engl. Farm., Vol. VII, No. XX, p. 156, Dec. 5, 1828.

(*a*) Reproduced in Harr., Entom. Corresp., pp. 348–351.

18. Contributions to Entomology, No. VI. N. Engl. Farm., Vol. VII, No. XXI, p. 164, Dec. 12, 1828.

(*a*) Reproduced in Harr., Entom. Corresp., pp. 351–354.

19. Insects on fruit trees (Cocci). N. Engl. Farm., Vol. VII, No. XXIV, pp. 186–187, Jan. 2, 1829.

20. Additional remarks on the bark louse or Coccus. N. Engl. Farm., Vol. VII, No. XXXVII, p. 289 (wood cuts), April 3, 1829.

21. American turnip butterfly (Pontia oleracea). N. Engl. Farm., Vol. VII, No. LI, p. 402, July 10, 1829.

(*a*) Reproduced in part in Harr., Entom. Corresp., p. 361.

22. Corrections and additions for the "Contributions to Entomology." N. Engl. Farm., Vol. VIII, No. I, pp. 1–2, July 24, 1829.

(*a*) Reproduced in part in Harr., Entom. Corresp., pp. 354–355.

23. Contributions to Entomology, No. VII. N. Engl. Farm., Vol. VIII, No. I, pp. 2–3, July 24, 1829.

(*a*) Reproduced in Harr., Entom. Corresp., pp. 359–359.

24. Insects (Ægeria pyri, Ichneumon hordei). N. Engl. Farm., Vol. IX, No. I, pp. 1–2, July 23, 1830.

(*a*) Reproduced in part in Harr., Entom. Corresp., p. 361.

25. Extracts from a paper entitled "Some account of the insect known by the name of the Hessian Fly, and of a parasitic insect that feeds on it, by Thomas Say" (with additional remarks). N. Engl. Farm., Vol. IX, No. II, p. 9, July 30, 1830.

26. Locust (Locusta carolina, Pterophylla concava, Tettigonia vitis,

Cicada septemdecim). Encycl. Amer., Vol. VIII, pp. 40–43. 8vo. Philadelphia, 1831.

27. A discourse delivered before the Massachusetts Horticultural Society, on the celebration of its fourth anniversary, Oct. 3, 1832, pp. 54; in a pamphlet entitled: Fourth Anniversary of the Massachusetts Horticultural Society. 8vo. Cambridge, 1832.

(*a*) Reproduced in N. Engl. Farm., Vol. XI, 1833. No. XXVI, p. 204, Jan. 9; No. XXVII, pp. 212–213, Jan. 16; No. XXVIII, pp. 200–201, Jan. 23; No. XXIX, pp. 225–226, Jan. 30; No. XXX, pp. 236–237, Feb. 6; No. XXXI, pp. 244–245, Feb. 13; No. XXXII, pp. 252–253, Feb. 20.

28. Report on the Geology, Mineralogy, Botany and Zoölogy of Massachusetts, by Prof. Hitchcock. 8vo. Amherst, 1833. Part VIII, Insects. pp. 566–595.

(*a*) Second edition of the same, corrected and enlarged. 8vo. Amherst, 1835. Part VIII, Insects. pp. 553–602.

(*b*) The latter part of (*a*), published separately at the same time, under the title, — Catalogue of the Animals and Plants of Massachusetts, with a copious index. 8vo. Amherst, 1835. Part VIII, Insects. pp. 33–82.

29. On a parasite of the honey bee. Hort. Reg. and Gard. Mag., Vol. I, pp. 44–45, Feb., 1835.

(*a*) Reproduced in N. Engl. Farm., Vol. XIII, No. XXX, p. 233, Feb. 4, 1835.

30. Upon the economy of some American species of Hispa. Bost. Journ. Nat. Hist., Vol. I, No. II. pp. 141–151 (wood cuts), 1835; read Feb. 18.

31. Characteristics of some previously described North American Coleopterous insects, and descriptions of others which appear to be new, in the collection of Mr. Abraham Halsey. Trans. Nat. Hist. Soc. Hartf., No. I, pp. 65–91 (with a colored plate), 1836. Communicated Dec. 23, 1835.

32. Report of the Commissioners on the Zoölogical Survey of the State (containing) Dr. Harris's Report (on Coleoptera). pp. 57–104. Mass. House Document, No. 72. 8vo. April, 1838.

33. Remarks upon Scarabæus goliatus, and other African beetles allied to it. Journ. Essex Co. Nat. Hist. Soc., Vol. I, No. II, pp. 101–107. 8vo. Salem, Mass, 1839.

34. Remarks upon the North American insects belonging to the genus Cyrchus of Fabricius, with descriptions of some newly detected species. Bost. Journ. Nat. Hist., Vol. II, No. II, pp. 218–204, Feb. 1839; read Aug. 15, 1838.

35. Worms in seed corn (Butalis cerealella). Yankee Farmer, Vol. V, No. VI, p. 43, Feb. 9, 1839.

36. Descriptive catalogue of the North American Insects belonging to the Linnæan genus Sphinx in the cabinet of the author. Amer. Journ. Sc. and Arts, Vol. XXXVI, No. II, pp. 282–320, July, 1839.

37. A Report on the Insects of Massachusetts, injurious to vegetation, published agreeably to an order of the Legislature, by the Commissioners on the Zoölogical Survey of the State. 8vo. pp. viii, 459. Cambridge: Folsom, Wells & Thurston, 1841.

(*a*) Another impression of the same, printed at the charge of the author, entitled — A Treatise on some of the Insects of New England, which are injurious to vegetation. 8vo. Cambridge: published by John Owen, 1842.

(*b*) A Treatise on some of the Insects of New England, which are injurious to vegetation; second edition. 8vo. pp. viii, 513. Boston: printed by White & Potter, 1852.

(*c*) A Treatise on some of the Insects injurious to vegetation. Third Edition (posthumous; illustrated by eight coloured steel plates and two hundred and seventy-eight wood cuts; edited by Charles L. Flint.) 8vo. pp. ix, 640. Boston, 1862.

[I have thought it unnecessary to give any references to the numerous extracts from, or reviews of, this work, which have appeared in various places.]

38. Wheat insects (Calandra granaria, Trogosita mauritanica, Tinea granella, Œcophora cerealella). N. Engl. Farm., Vol. XIX, No. XXXVIII, p. 300, March 24, 1841.

39. Wheat insects, continued (Cecidomyia tritici). N. Engl. Farm., Vol. XIX, No. XXXIX, pp. 306 307, March 31, 1841.

40. Memorandum on the larva of Papilio Philenor. Newman's Entomologist, Part II, No. IV, pp. 60–61, April, 1841.

41. Remarks on some North American Lepidoptera, by Edward Doubleday, Esq., including a communication from T. W. Harris, M. D., of Boston, U. S. (Dryocampa? -Saccophora- Melsheimeri). Newm. Ent., No. VII, pp. 99–191 (wood cuts), May, 1841.

42. Plum tree grubs. N. Engl. Farm., Vol. XIX, No. LI, p. 405 (wood cuts), June 23, 1841.

43. Apple tree borer (Saperda bivittata). Mass. Ploughm., Vol. I, No. XVII (wood cut), Jan. 22, 1842.

(*a*) Reproduced in N. Engl. Farm., Vol. XX, No. XXXIII, pp. 260–261, Feb. 16, 1842.

44. The squash vine destroyer (Ægeria cucurbitæ). N. Engl. Farm., Vol. XX, No. XXXIII, p. 260 (wood cut), Feb. 16, 1842.

45. Squash vine destroyer (Ægeria cucurbitæ). Mass. Ploughm., Vol I, No. XXXVII, June 11, 1842.

46. A new disease of the plum (Thrips). Hov. Mag. Hort., Vol. VIII, pp. 247–248, July, 1842.

47. Blight beetle (Tomicus pyri). Mass. Ploughm., Vol. II, No. XXXVIII, June 17, 1843.

(*a*) Reproduced in N. Engl. Farm., Vol. XXII, No. III, p. 21, July 19, 1843.

48. The disease of the sycamore tree (Tingis, Noctuæ). N. Engl. Farm., Vol. XXI, No. L, p. 406, June 21, 1843.

49. Apple worm, curculio, plum grub (Carpocapsa pomonella, Conotrachelus nenuphar). N. Engl. Farm., Vol. XXII, No. II, p. 13, July 12, 1843.

50. Description of an African beetle allied to Scarabæus polyphemus, with remarks upon some other insects of the same group (extracts). Proc. Bost. Soc. Nat. Hist., Vol. I, pp. 151–153; read Nov. 1, 1843 (signatures Nov. and Dec. 1843).

51. Description of an African beetle allied to Scarabæus polyphemus, with remarks upon some other insects of the same group (with a copper plate). Bost. Journ. Nat. Hist., Vol. IV, No. IV, pp. 397–405, Jan., 1844.

52. Coated Saperda of the linden tree (Saperda vestita). Farm. Cab., Vol. VIII, No. VII, pp. 213–214, Feb. 15, 1844.

53. Some account of the insect that attacks the grape vine (Procris americana). Hov. Mag. Hort., Vol. X, pp. 201–205 (wood cuts). June, 1844.

54. A new depredator of the orchard (Clisiocampa sylvatica). N. Engl. Farm., Vol. XXII, No. LII, p. 412, June 26, 1844.

55. Destructive insects on peach trees and grape vines at Nantucket (Cocci). N. Engl. Farm., Vol. XXIII, No. I, pp. 4–5, July 3, 1844.

56. Cucumber skippers (Smynthurus cucumeris). Mass. Ploughm., Vol. III, No. XLII (wood cuts), July 20, 1844.

(*a*) Reproduced in Harr., Entom. Corresp., p. 362.

57. Remarks upon Saperda vestita, the borer of the Linden tree, with extracts from letters upon the same insect. Hov. Mag. Hort., Vol. X, pp. 311, 330–333 (wood cuts), Sept. 1844.

58. Insects in the corn (Butalis cerealella). Farm. Cab., Vol. XI, No. IV, pp. 106–107, Nov. 16, 1846.

59. Microgasters. Bost. Cult., Vol. IX, No. XVIII, p. 138, May 1, 1847.

60. On the blights of the pear tree (Tomicus pyri). Down. Hort., Vol. II, No. VIII, pp. 365–367, Feb. 1848.

61. Canker worms (Anisopteryx vernata). Prairie Farm., Vol. VIII, No. VI, pp. 172–173, June, 1848.

(*a*) Reproduced in Mass. Ploughm., Vol. VII, No XXXIX, June 24, 1848.

62. The potter wasp (Eumenes fraterna). Bost. Cult., Vol. X, No. XXIX, p. 225 (wood cut), July 15, 1848.

63. Correspondence on the black wart of the plum tree (Cicada). Down. Hort., Vol. III, pp. 277–279, Dec., 1848.

64. Canker worms (Anisopteryx vernata). Bost. Cult., Vol. XI, No. XLVII, p. 376, Nov. 24, 1849.

65. Termites. New Orleans Picayune, January, 1850.[1]

66. Description of some species of Lepidoptera from the northern shores of Lake Superior; in Lake Superior, by Louis Agassiz (lithographic plate). 8vo. Boston, 1850. Art. IX, pp. 386–394, pl. vii.

67. Saw-fly of the raspberry, Selandria (Hoplocampa) rubi (in a letter to Miss Darling). N. Engl. Farm., n. s., Vol. II, No. II, p. 33 (wood cuts), Jan. 19, 1850.

68. Insects on potatoes (Baridius trinotatus). N. Engl. Farm., n. s., Vol. II, No. XIII, p. 204, June 22, 1850.

69. Potato bug (Cantharis vittata). Prairie Farm., Vol. X, No. VIII, p. 247, Aug., 1850.

70. Injurious insects (Conotrachelus nenuphar, Carpocapsa pomonella, Aphides, Clisiocampa americana, Anisopteryx vernata, Macrodactylus subspinosus). N. Engl. Farm., n. s., Vol. II, No. XVI, p. 252, Aug. 3, 1850.

71. The cranberry worm. N. Engl. Farm., n. s., Vol. II, No. XXII, p. 348, Oct. 26, 1850.

72. Canker worms (Anisopteryx vernata). Mass. Ploughm., Vol. X, No. VIII, Nov. 23, 1850.

73. Canker worms (Anisopteryx vernata). Mass. Ploughm., Vol. X, No. XXXIII, May 17, 1851.

74. The currant tree borer (Ægeria tipuliformis). Hov. Mag. Hort., Vol. XVII, pp. 241–244 (wood cut), June, 1851.

75. Plum weevils (Conotrachelus nenuphar). Bost. Cult., Vol. XIII, No. XXIV, p. 187, June 14, 1851.

(*a*) On the curculio. Down. Hort., Vol. VI, p. 341, July, 1851.

76. Letter on potato rot. Salem Obs., Vol. XXIX, No. XXVIII, July 12, 1851.

(*a*) Reproduced in Bost. Cult., Vol. XIII, No. XXIX, p. 228, July 19, 1851.

(*b*) Insects not the cause of potato rot. N. Engl. Farm., n. s., Vol. III, No. XVI. pp. 259–260, Aug. 2, 1851.

77. A new insect depredator (Capsus quadrivittatus). N. Engl. Farm., Vol. III, No. XVII, p. 268, Aug. 16, 1851.

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[1] I have not seen this paper. It is thus referred to by Mr. Thomas Affleck of Mississippi, in a letter to Dr. Harris, dated Jan. 23, 1850. "I send you herewith a copy of the number of the New Orleans Picayune, our most influential Southern paper, which contains your article on the Termites I sent you." The specimens were sent to Dr. Harris in a letter dated Nov. 10, 1849; and which bears the memorandum of Dr. Harrsi, "Answered Nov. 29, Dec. 20, 1849."

78. The potato disease not caused by insects (in a communication to J. W. Proctor). N. Engl. Farm., n. s., Vol. III, No. XVIII, p. 287, Aug. 30, 1851.

79. Insects on the potato vine (Aphides, Phytocoris lineolaris, Criocerus trilineata, Galeruca vittata, Haltica striolata, Scatophaga postilena, Sphinx quinquemaculata, Baridius trinotatus). Journ. Agric., Vol. I, No IV, pp. 99–102, Sept. 3, 1851.

80. Chinch bug (Rhyparochromus devastator). Alb. Cult., Vol. VIII, No. XII, pp. 402–403, Dec., 1851.

81. On Cincindelæ. Fam. Vis., Vol. II, No. XXXIX, p. 305 (wood cuts), Feb. 3, 1852.

82. Canker worms (A. vernata). N. Engl. Farm., n. s., Vol. IV, No. IV, pp. 155–156, April, 1852.

83. Letter to Dr. Princle, giving a history of his report. Fam. Vis., Vol. II, No. L, p. 398, April 20, 1852.

84. The joint-worm (Eurytoma hordei). N. Engl. Farm., n. s., Vol. IV, No. VIII, pp. 385–386, Aug., 1852.

85. The oak pruner (Stenocorus putator). N. Engl. Farm., n. s., Vol. IV, No. IX, p. 425, Sept., 1852.

86. The oak pruner. N. Engl. Farm., n. s., Vol. IV, No. X, p. 453, Oct., 1852.

87. Insects in the wheat (Eurytoma hordei). Journ. Agric., Vol. III, No. X, pp. 290–291, April, 1853.

88. Palmer worm (Rhinosia pometella). Cambridge Chronicle, Vol. VIII, No. XXX, July 23, 1853.

(*a*) Reproduced in Trans. New York St. Agric. Soc., Vol. XIII, pp. 190–192, 1854. (See No. 92.)

89. The palmer worm. N. Engl. Farm., n. s., Vol. V, No. VIII, pp. 370–371, Aug., 1853.

90. The rosy Hispa and the drop worm (Hispa rosea, Oiketicus coniferarum). Down. Hort., Vol. VIII, pp. 461–464 (wood cuts), Oct., 1853.

91. Report on some of the diseases and insects affecting fruit trees and vines. Proc. Amer. Pomol. Soc., pp. 210–218, 1854.

(*a*) Reprinted under the title — Report on insects and diseases injurious to vegetation. 8vo. Boston, 1854. pp. 11.

(*b*) Reproduced in Journ. U. S. Agric. Soc., 1854, pp. 197–210.

92. Letter from Dr. Harris (Ithycerus noveboracencis). Trans. N. Y. St. Agric. Soc., Vol. XIII, pp. 188–189, 1854.

(*a*) Reprinted with 88 (*a*) and other matter as — Apple tree pests, pp. 11–13. 88 (*a*) formed pp. 13–16.

93. Description of Rhinosia pometella Harris. Proc. Bost. Soc. Nat. Hist., Vol. IV, pp. 349–351; read July 20, 1853.

94. Extract of a letter to Dr. Kirtland, from Dr. Thaddeus W. Harris, dated Cambridge, March 13, 1854 (Vanessa Milberti). Ann. of Sc., Vol. II, No. IV, p. 100, April, 1854.

95. Note upon the insects injurious to the roots of the cultivated grape vines in North Carolina; in a pamphlet entitled,—The grape vine borer; in a communication on the grape vine, by Dr. E. Mitchell, in the Raleigh Register for April 5, 1854. 8vo. pp. 6–7.

96. Larvæ of the crane fly (Tipula). N. Engl. Farm., Vol. VI, No. V, p. 210, May, 1854.

97. Canker worms (A. vernata). N. Engl. Farm., n. s., Vol. VI, No. VIII, p. 363, Aug. 1854.

98. The Cetonia Inda. N. Engl. Farm., n. s., Vol. VI, No. X, pp. 457–458, Oct., 1854.

99. The Indian Cetonia. N. Engl. Farm., n. s., Vol. VI. No. X, p. 485, Oct., 1854.

100. The measure worm (Geometra niveosericearia). Hov. Mag. Hort., Vol. XXI, pp. 418–423 (wood cut), Sept., 1855.

101. Rose bug (Macrodactylus subspinosus). Bost. Cult., Vol. XVII, No. XXXVI, p. 283, Sept. 8, 1855.

102. Observations on the transformations of the Cecidomyiæ (posthumous). Proc. Bost. Soc. Nat. Hist., Vol. VII, pp. 179–183.

103. On Cicindela Hentzii (posthumous). Proc. Bost. Soc. Nat. Hist., Vol. VII, pp. 185–189.

104. On the synonymy of three North American butterflies (Danais Berenice Cramer, Danais Erippus Cramer and Limenitis Misippus Fabr.) (posthumous). Proc. Bost. Soc. Nat. Hist., Vol. VII, pp. 189–190.

105. Description of Hoplocampa rubi (posthumous). Proc. Bost. Soc. Nat. Hist., Vol. VII, pp. 235–236.

106. The Entomological Correspondence of Thaddeus William Harris, edited by Samuel H. Scudder. Occ. Papers Bost. Soc. Nat. Hist., I (with a portrait, four steel plates and fifty-four wood cuts). 8vo. pp. xlvii, 375. Boston, 1869.

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107. Description of a nondescript species of the genus Condylura (C. prasinata). Bost. Journ. Phil. and Arts, Vol. II, No. VI, pp. 580–583, 1825.

108. Free Martins; in a letter from Hon. John Welles. Bost. Med. and Surg. Journ., Vol. III, No. XV, pp. 239–240, May 25, 1830.

(*a*) Reproduced in N. Engl. Farm., Vol. IX, No. VIII, pp. 61–62, Sept. 10, 1830.

109. List of native plants discovered growing near Boston, the present season; in a letter read before the Massachusetts Horticultural Society. Hov. Mag. Hort., Vol. VI, No. VII, pp. 245–247, July, 1840.

110. Custard squash. N. Engl. Farm., n. s., Vol. III, No. IV, p. 59 (wood cut), Feb. 15, 1851.

111. Acorn squash. N. Engl. Farm., n. s.; Vol. III, No. XXIII, pp. 366–367, Nov. 8, 1851.

112. Pumpkins, Squashes. N. Engl. Farm., n. s., Vol. IV, No. II, pp. 58–59, Feb., 1852.

113. The late Dr. Holbrook. Bost. Med. and Surg. Journ., Vol. XXVI, No. XXIII, pp. 358–360, July 13, 1842.

114. Notes on the Josselyn Family, of Massachusetts. N. Engl. Hist. and Gen. Reg., Vol. II, No. III, pp. 306–310, July, 1848.

PERIODICAL WORKS REFERRED TO IN THE PREVIOUS LIST.

1. Massachusetts Agricultural Repository and Journal, Vols. VII, X. 8vo. Boston, 1823, 1827.

2. New England Farmer. Vols. I, IV–IX, XI, XIII, XIX–XXIII. 4to. Boston, 1823, 1826–30, 1833, 1835, 1841–1844. Ditto. n. s., Vols. II–VI. 8vo. Boston, 1850–1854.

3. Boston Journal of Philosophy and the Arts. Vols. I, II. 8vo. Boston, 1824–1825.

4. New England Journal of Medicine, Surgery, and collateral branches of Science. Vol. XIII. 8vo. Boston, 1824.

5. Journal of the Academy of Natural Sciences of Philadelphia. Vol. V. 8vo. Philadelphia, 1827.

6. New England Historical and Genealogical Register. Vol. II. 8vo. Boston, 1848.

7. Boston Journal of Natural History. Vols. I, II, IV. 8vo. Boston, 1835, 1839, 1844.

8. Proceedings of the Boston Society of Natural History. Vols. I, IV, VII. 8vo. Boston, 1843, 1854, 1860.

9. Horticultural Register and Gardener's Magazine. Vol. I. 8vo. Boston, 1835.

10. Transactions of the Natural History Society of Hartford. No. I. 8vo. Hartford, Conn., 1836.

11. Yankee Farmer. Vol. V. 8vo. Boston, 1839.

12. Journal of the Essex County Natural History Society. Vol. I. 8vo. Salem, Mass., 1839.

13. American Journal of Science and Arts. Vol. XXXVI. 8vo. New Haven, 1839.

14. Newman's Entomologist. 8vo. London, 1841.

15. Massachusetts Ploughman. Vols. I–III, VII, X. Folio. Boston, 1842–1844, 1848, 1850, 1851.

16. Hovey's Magazine of Horticulture. Vols. VI, VIII, X, XXI. 8vo. Boston, 1840, 1842, 1844, 1855.

17. Farmer's Cabinet. Vols. VIII, XI, XVII. 8vo. Philadelphia, 1844, 1846, 1851.

18. Boston Cultivator. Vols. IX–XI, XIII, XVII. Folio. Boston, 1847–1849, 1851, 1855.

19. Downing's Horticulturalist. Vols. II, III, VI, VIII. 8vo. New York, 1848, 1851, 1853.

20. Prairie Farmer. Vols. VIII, X. 8vo. Chicago, 1848, 1850.

21. Boston Medical and Surgical Journal. Vols. III, XXVI. 8vo. Boston, 1830, 1842.

22. New Orleans Picayune. Jan., 1850.

23. Salem Observer. Vol. XXIX. Folio. Salem, Mass., 1851.

24. The Journal of Agriculture. Vols. I, III. 8vo. Boston, 1851, 1853.

25. Albany Cultivator. Vol. VIII. 8vo. Albany, 1851.

26. Family Visitor. Vol. II. Folio. Cleveland, Ohio, 1852.

27. Cambridge Chronicle. Vol. VIII. Folio. Cambridge, 1853.

28. Proceedings of the third session of the American Pomological Society at their fifth meeting held in Boston. 8vo. Boston, 1854.

29. Annals of Science. Vol. II. 8vo. Cleveland, Ohio, 1854.

30. Journal of the United States Agricultural Society for 1854. 8vo. Boston, 1855.

31. Transactions of the New York State Agricultural Society. Vol. XIII. 8vo. Albany, 1854.

CORRESPONDENCE

BETWEEN

THADDEUS WILLIAM HARRIS

AND

NICHOLAS MARCELLUS HENTZ.

CORRESPONDENCE.

HARRIS TO HENTZ.

MILTON, August 19, 1824.

THIS will announce to you the entire failure in the publication of the late Professor Peck's Lectures, and I regret also that the time which you have devoted towards that object is to be lost.

I have met with but a few spiders; none perhaps on inspection will appear new to you. One very large species, which forms a web on bushes, must be a formidable enemy to the winged creation. It is velvety black, with six spots of light yellow on the abdomen; eyes eight, in two double rows which curve backwards; mandibles strong, hairy and toothed beneath and terminated with a short, crooked claw; fourth pair of feet the longest; third pair shortest; first and second pairs nearly equal; legs with a few scattered bristly hairs; maxillæ and lip obtuse, and very hairy. The sketch I have added may perhaps bring the species to your recollection if you have ever seen it; it is exactly of the natural size. I would observe that the two largest eyes are not round, but irregular, and, at first view, I thought they were geminated. If it is new to you, I shall present it to you on the first opportunity.

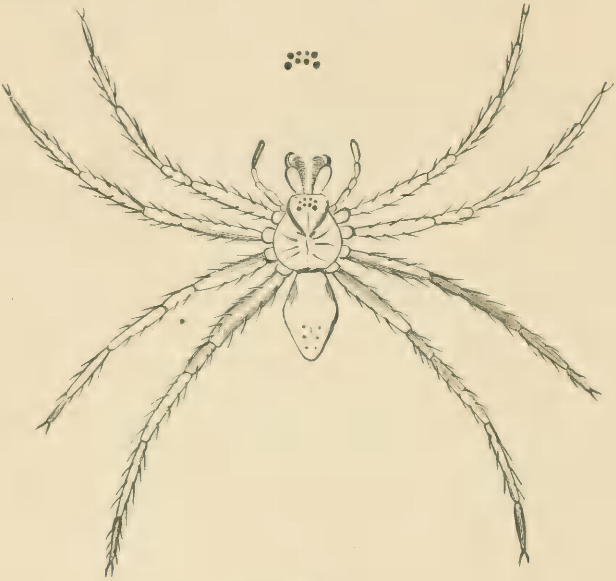

Fig. 1.

I would take the liberty to request of you to lend me your volumes of Schönherr, or any other work on Entomology which you think would assist me in making out the genera and species of insects, if you are not about to make use of them during the ensuing vacation; be assured that they will be used with care and returned safely to you. Since the publication of Prof. Peck's lectures has been given up, I have had some thoughts of devoting a portion of my leisure to describing the insects in this vicinity, and though I feel incompetent to the task, still I would undertake it, unless I find it likely to be undertaken by some one else; any assistance you could afford me would be gratefully received and duly acknowledged.

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[1] See also the letter of Sept. 4, 1828 (Harris to Hentz).

HARRIS TO HENTZ.

MILTON, May 16, 1825.

I have devoted some of my leisure to determining the species of my collection, about eight hundred in number. I have been most sure of foot in Coleoptera, having ascertained the names of two hundred species; and about one hundred and fifty still remain unknown to me. I expect to be able to affix the specific names to these with the assistance of Mr. Say, and for this purpose am about making a case to contain the undetermined species of all orders remaining in my collection. These I shall send by water to Philadelphia for the examination of Mr. Say, after which they will be returned to me by the same conveyance. I am under the necessity of resorting to this method because I have so few duplicates, and so many of the most interesting species are unique. If you are disposed to coöperate with me in this undertaking and will entrust to my care one individual of each species that you have, I will return to you such of them as I have determined, with the names affixed, and will unite the remaining undetermined species with mine to be restored, if desirable, as soon as they shall have undergone investigation by Mr. Say and myself. I will confide to you that my principal object (after having become acquainted with the specific names and characters of these insects) is to prepare something like a Faunula Insectorum Bostoniensis. This I would not attempt from any confidence in my own ability of doing justice to the task, but from a conviction that such a work might be useful, and would supply the young entomologist with a cheap and concise account of the species which are common to this vicinity, without obliging him to have recourse to many voluminous, expensive and rare works.

To accomplish this thoroughly, I must request the assistance of such of my friends as have made entomology a pursuit, so far at least as to ascertain what species may have been observed here.

HARRIS TO HENTZ.

November 28, 1825.

Your letter afforded me great satisfaction, and the box which was received soon afterward furnished me with another proof of your kind remembrance.

I have carefully examined the insects you sent me, several of which have not occurred in this place, and which, therefore, are very interesting to me; particularly your two species of *Chremastocheilus*; one of which, as I before observed to you, is assuredly the *C. castaneæ* of Knoch (not *castaneus*, as it is frequently written); the other, I am inclined to think with you, is a distinct species. It would be worth while to distinguish the sexes of these species, which would probably be determined by an examination of the antennæ; the laminæ of the club are longer and larger in the males of most *Scarabæi.* Your new species you have named *piger*, I suppose from its dull and sluggish habits. I wish you would furnish an account of these two species for the Boston Journal of Philosophy, with reference to the authors who have described the *castaneæ.* Some remarks on this insect are to be found in Latreille's work, which makes a part of Sonnini's Buffon; and also in Cuvier's Règne Animal. *Saperda canadensis* Oliv., is new to me, as is also the insect you have marked *Rhynchænus proboscideus*; but which cannot be the *proboscideus* of Fabricius, his insect having the rostrum *twice the length of the body*; it seems nearer allied to *R. nucum* Fabr. Your large *Prionus* is certainly the *brevicornis* of Fabricius; it is a female. The smaller one is a male, and probably of the same species. I have four females which vary in size, the smallest being not much larger than the male you sent me, which is the only one I have seen. Of *Helops micans* I fortunately obtained last summer an individual (though inferior to yours in beauty) in the tan or debris beneath the bark of a decayed tree, where also I discovered two specimens of the large smooth *Tenebrio.* Of this latter insect I could find no description, and therefore send you the name I had attached to my specimen, which is *Tenebrio glaber*, from its smoothness, in which it differs from all others I have as yet seen. It may be among those mentioned in Melsheimer's Catalogue, and until this can be ascertained the name is given only provisionally. This remark applies also to the name of the *Cerambyx*, allied to *tornator*, of which I found one small specimen on the *Asclepias syriacea.* It stands in my cabinet as *Stenocorus obliquans*, from the oblique or rhomboid fascia on the elytra; it may perhaps be *Lamia M-nigra* of Melsheimer. The unarmed *Onthophagus* (*Copris*) I have always taken to be the female of *latebrosus.* Individuals of the male sex vary considerably in the size and projection of the thoracic protuberance.

HENTZ TO HARRIS.

NORTHAMPTON, Dec. 4, 1825.

In the *Chremastocheilus* I have observed no material difference in regard to the antennæ, but the sex you can ascertain by softening the abdomen in warm water. If you are inclined to publish an account of these two very distinct species, you are fully authorized by me to make use of my communication to you, as well as any other remark I may have made on other subjects. The reason why I called the larger species *piger* is this: the first specimen I found (alive and in perfect health) I observed on dried leaves moving with swiftness and likely to escape me, but when I came near, I perceived that it was not by means of its own powers that it travelled at such a rate, but that it had taken a new mode of performing its journey, namely, the legs of a little ant, that dragged it peaceably and unopposed by one of its hind legs, an admirable *coursier*, and an unheard of method of travelling with speed among insects. I never found one actually walking by its own impulses.

Rhynchœnus proboscideus, I am still inclined to think is the *proboscideus* of Fabricius, as the length of the proboscis and the color of the body vary in every specimen which I have observed. The proboscis of one was at least longer than the body; but that method of giving the measure of insects I find very incorrect in most authors, and liable to deceive the student.

Pelecinus polycerator is common among us. I have usually found it on the oak trees, flying slowly, and easily caught; its turns its abdomen like a wasp, or an ichneumon, apparently striving to sting the hand that holds it. *Midas filata* is not very rare, but caught with difficulty.

HENTZ TO HARRIS.

NORTHAMPTON, Jan. 1, 1826.

I have taken pains to dissect two specimens of *Chremastocheilus;* this is the result. The different parts of the mouth do not materially differ in shape; but in the smallest species, *C. castaneus*, I could not see any trace of the labium (upper lip), whilst in *C. piger* that part is quite large. Thinking that I might have lost or left unobserved the labium in the first dissection, I took another insect of the same species, the last but one in my cabinet, and became convinced that that part was certainly wanting in *C. castaneus*. I sent a drawing of both species to Mr. Say, with descriptions, more than three months ago, and thought my letter might not have reached him; but some days ago I received an obliging answer to my various questions. He thinks both species are new, as both differ from the description of *C. castaneus*; that I cannot decide, for all the knowledge I have of that species is derived from a very short description by Latreille (in the Hist. des Crust. et des Ins.) which describes it as being *tout noir*, and refers to Knoch, but I have not the work of that naturalist.

Mr. Say proposes to me to publish those two insects, but he is now gone to the West, and may not return for some time, so that I would advise you to do it yourself if you are inclined.

Of *Vanessa C-album* I have not sufficient recollection to assist you; but would rather be inclined to think that the American butterfly is a distinct species. Several insects which would have appeared to me to be the same as the European, before examination, proved to be quite distinct when compared carefully.

Cicindela sexguttata I have frequently observed, and have many accidental varieties. The color varies from a deep blue to a bright green. I have several with the additional spot which you mention; but if you examine your specimens with care you will, I think, discern that mark, or a faint trace, in most of them.

I have *Carabus silvosus*, which I recognized by your description, and named it thus in my cabinet; but I have a beautiful *Calosoma* closely allied to *C. silvosus*, in shape and color; it is, however, much smaller, and has no violet margin; I have reasons to think that species very rare, and possibly not described. (Is it *Calosoma obsoleta* Say? Journ. p. 149. T. W. H.) Oh! why must we live at such a distance from each other? What pleasures we might enjoy together. I feel the want of books still more than you do. You have access to libraries, and can consult Olivier's valuable work.

Omophron labiatum is quite common here in May.

HARRIS TO HENTZ.

MILTON, Feb. 6, 1826.

So long a time had elapsed since my last letter without my having heard from you, that I had made some examination of the mouth of *Chremastocheilus* in order to enable me to complete the paper which I had drawn up. [Pl. IV, figs. 7^a–7^e.]

This paper was sent to the publishers of the Boston Journal of Philosophy before I had received your letter, and is now probably in press.[1] As to the *labium superius* or *labrum* of these insects, I was contented with the observation of Latreille (Hist. des Crust. et des Ins., Vol. 3, p. 153). He observes that the "*upper lip* is concealed, corneous according to Knoch, probably membranous." Knowing this, I made no search for it. But it is the form of the *mentum* which takes the place of the *labium inferius* or *labium*, that particularly interested me. This part appears on examination to have a semicircular notch in the edge, which divides it into two lobes, and the lobes themselves are ciliated. Have you observed this character? I think I can hardly be deceived, and should like to know whether this circumstance was as evident to you as to me. The publishers have agreed to furnish an engraving of these and some other insects which I have described for the number to appear in April, when I shall gladly give you credit for the observations you have made of the parts of the mouth, and have only to regret that I cannot avail myself of them in the present number. The insects which I am about to describe are the two goliath species of *Trichius*, and one or two *Cetonia*, genera closely allied to *Chremastocheilus*. Descriptions of *T. eremicola* and *scaber* and *Cetonia barbata* are ready, and I should like to obtain one other native *Cetonia* that has not already been figured, to complete the paper. I found two specimens of *C. fulgida* last summer, and you gave me *C. nitida*; but both have been described by Olivier. I have one other, which I sent to Mr. Say, and he named it *C. vestita*; but it is of doubtful origin, and may have been introduced from Europe. If you have any other native species than the four named above, I should be very glad to borrow it for the purpose of giving a figure or description in the April number of the Journal.

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[1] [This paper did not appear in the Boston Journal of Philosophy, but was afterwards sent to the Academy of Natural Sciences of Philadelphia and published in the fifth volume of their Journal.]

You ask me where I found the description of *Trichius eremicola.* That name occurs in Melsheimer's catalogue, and I was led to suspect its identity from the supposition that the name was given it because of some similarity which it might bear to *T. eremita* of Europe. I afterwards found it described by Mr. Say in Vol. III, p. 240 of the Journal of the Academy of Natural Sciences. *T. scaber* is described by M. Palisot de Beauvois in his magnificent work, which we have in the College Library. Do you recollect the potent smell of this insect, and do both species exhale an equally powerful odor?

This winter has been to me a most propitious time for the study of entomology, about which I have employed myself in good earnest. The *Papilionidæ* have occupied me some time; and I have discovered excellent generic characters in the nervures of the wings.

Have you ever seen a *Rhagium?* In January I obtained from beneath the bark of a tree nearly twenty males and females of *R. lineatum* Olivier. It was the first time I had ever found a specimen of the genus, and you can conceive the pleasure it afforded me. In the same month I also found numerous specimens of a species of *Polyxenus.*

Lytta (or more properly, *Cantharis*) *ænea* I have never seen. Mr. Say observes that it is rare. I cannot but regret that Mr. Say should have adopted the name of *Lytta* on the authority of Fabricius and Dejean alone, when the name *Cantharis* is sanctioned by commercial usage and the authorities of Geoffroy, DeGeer, Olivier, Lamarck, Latreille, Dumeril and Leach. The same vicious nomenclature occurs in his use of the name *Cantharis* (with Linnæus and Fabricius) instead of *Telephorus*, which latter is adopted by Schäffer, DeGeer, Lamarck, Latreille, Olivier, Duméril and Leach.

HENTZ TO HARRIS.

NORTHAMPTON, Feb. 19, 1826.

I am glad that you will publish an account of the *Chremastocheili* and *Cetoniæ*. Let me make one remark on the *C. barbata* of Mr. Say. Before I had read his description I had marked it *C. Inda*, the *Trichius Inodus* of Fabr., who remarks in his first book on Entomology that the insect is probably a *Cetonia*. It is marked as inhabiting India, but there are many errors to be found in the account of the residence of insects in Fabricius; for instance, in that of the *Melolontha lanigera*. It may then be an error, and the description is exact in Fabricius. I even think that Olivier's plate corresponds with the insect. You know it is extremely common in the North and South, and must have been early sent to European collections; in a word, I still think Mr. Say may have given a new name to an insect described before him, which I also fear he has done in *Silpha lapponica*, and this is more likely, since many species of that genus and *Necrophorus* are common to both continents.

I have no *Cetoniæ* to offer you; but of the genus *Trichius* I have the *bibens* of Pennsylvania, and a very beautiful insect probably belonging to that genus, of which I have but one specimen; it is certainly not described by Fabricius, though it may be the *Trichius capucinus* of Melsheimer, as its color is that of our *capucinus*, namely, a chestnut color; the thorax, scutel, body and abdomen are covered with yellowish or ferruginous hair. Its elytra, shorter than the abdomen, are also narrower towards the end, and being separated naturally, do not form a regular suture. Do you know this insect?

Your discovery for the classification of Lepidoptera by the nervures of the wings, as Jurine has done for Hymenoptera, must be of high importance in a class which naturally requires more divisions; you may believe that I shall be happy to learn your method, when you have leisure to explain it to me.

When do you think your *Faunula* will be prepared for the press? I am very anxious to have the use of it. I trust you will have plates. Can you obtain the lithographic stone? If you can, you might have your own drawings printed in Boston, by a man, who, I see by the papers, has just established himself there for that purpose.

HARRIS TO HENTZ.

April 8, 1826.

Your last letter received February 23d, is before me, and has afforded me a subject of some useful study and reflection. But before replying to its contents, I will recur to your previous communication in which, on a review of its contents, I regret to find a query unanswered by me. You remark that the insect marked by me, *Ips fasciata*, does not correspond with the Fabrician description. This is true; for Fabricius does not appear to have known our insect. It is, however, correctly figured and described by Olivier as *Nitidula fasciata*, and is also described by Latreille under the same name. The genus *Ips* is now restricted to a few Fabrician species allied to the *quadripustulatus* of Europe, and some others, of which two or three are natives of this State. Among these *Ips sanguinolentus* (*Nitidula sanguinolenta* Oliv., Latr.) most nearly approaches *fasciata* in size and figure. The head and thorax are black, the elytra reddish, each with a central black dot, and black tip. *Ips quadriguttata?* Fabr. (*Nitidula quadriguttata* Olivier) most nearly resembles *fasciata* in markings, but is much smaller, being only between two and three twentieths of an inch in length. Our *Ips fasciata* might at first be easily taken for a miniature representation of two noble native species of the genus *Engis*, to which genus *Ips* is closely allied. One is *Engis fasciata*, the other, a still larger species, is *Engis heros* of Say, whose description is very accurate. These are probably the largest of the genus.

Having now endeavored to atone for my past omission, I take up your last letter. *Cetonia barbata* does not agree with Olivier's description and figure of *Trichius Inda* Fabr., and although I have made the comparison, not having the volume at hand, I cannot point out the peculiarities of the two species, but think they differ most in the form of the thorax.

The brief description and slight sketch of a species which you think may probably belong to the genus *Trichius*, has considerably interested me, and at the same time has led me to believe that it belongs to none of Latreille's new genera, separated from *Melolontha* Fabr., and more closely allied to *Trichius*. No species I have ever seen agrees with your description, nor indeed did I know that any species of the genera in question were natives of this country. The genera to which I allude are *Glaphyrus*, *Amphicoma* and *Anisonyx*. An examination of the nails, with a description of the genera, will probably determine your doubts.

Although I have already taxed your patience so long about examination of the nails, permit me to make another remark now brought to my recollection; viz., there is an extremely natural section of the genus *Elater*, distinguished by having pectinated nails, and also easily recognized by the broadness of the thorax and elytra at base, and the attenuation of the elytra behind. This character has not, to my knowledge, been described by any entomological writer; the section or subgenus, has perhaps as much claim to be considered a distinct genus as *Lebia* Latr. and Bonelli (a genus separated from *Carabus*), which is also distinguished by pectinated nails.

In the Boston Collection I find your *Chremastocheilus piger*, and Dr. Pickering possesses the other, which he obtained on Lynn beach. The dimensions of these insects vary. Will you send me accurate measurements of the largest and smallest of each of your species; I should be glad to know them.

HENTZ TO HARRIS.

NORTHAMPTON, April 23, 1826.

I thank you for the information about *Ips fasciata*; it is not the first error detected in Fabricius.

My doubts about *Cetonia barbata* are removed; I knew that Olivier had described it, and that you could inform me of the truth. I have examined the insect which I had called *Trichius vulpinus* too hastily, and though I have not dissected it, having but one specimen, I am convinced that it cannot belong to the genus *Trichius* since the labrum is prominent, nor to *Glaphyrus* of Latreille, as the club of the antenna has its lamellæ disengaged. It belongs, therefore, to *Amphicoma*, as you thought, if on dissecting it we find it to have corneous mandibles. The characters of *Anisonyx* do not agree with it, the labrum being very prominent. *Hoplia trifasciata* I have called *Melolontha variabilis* Fabr. or *Hoplia variabilis*, as it certainly belongs to that subgenus if adopted. That insect agrees with the phrase of Fabricius, *varietas americana tomento aureo tecta*, and the name *variabilis* also agrees with it, as you hardly ever find two specimens with the same colors or markings; it varies from piceous or black to bright testaceous or rufous. The fasciæ are quite obsolete or wanting in some, and very distinct in others. I may be mistaken, but your remarks will solve my doubts. I have three specimens, of which one is still at your service. How is it that the *Melolontha polyphaga* of Melsheimer, which forms the type of your subgenus *Stenothorax*, is called *subspinosa* by Fabr., and *angustata* by Beauv.? Has the name been changed, or was Melsheimer mistaken?

Your subgenus *Stilboptera* seems strongly marked and useful in a genus which has still so many species. Of the subgenus *Dichelonyx* I cannot judge, not having the insect with which you form its type. Your subgenus VII, without a name affixed, having the *M. lanigera* for its type, is also strongly marked;

but, having only one species for it, as well as for your *Stenothorax*, will it serve the science as much as your other divisions? The great defect of the system of the Father of Natural History was that it had often too many species in the same genus; it became necessary to make more divisions, but some authors fell into the opposite defect, creating a confusion with an intention to simplify. Now the genus *Melolontha*, a division of Linnæus' enormous genus *Scarabeus*, is still too large, and I conceive your divisions will be highly useful, when you can comprehend in them a certain number of insects. Should you find more species for your seventh subgenus I should think it an excellent one; and I doubt not your being able to do so, and, moreover, your adding new divisions as you study the minute parts of the insects of that genus and others; for I do not doubt that every species is possessed of some mark in its formation, which, independent of its colors, could distinguish it from the rest; the object is to find such a mark, not common to the whole genus, occurring in a sufficient number of species to permit us to separate them into a limited division, which may be easily run over by the student.

Your proposed division of the genus *Elater* is very necessary; and I hope you will make it. Should you find a similar one for the genus *Buprestis* you would much improve the science.

I subjoin the dimensions of the elytra of the *Chremastocheilus*, measuring its length from its apex at the suture to its union with the thorax near the scutel. As the thorax, or the head, is more or less bent, the measurement might be more incorrect if I took the whole insect, than if I gave you the length of the elytra.

C. piger. Largest, nearly $\frac{4}{10}$ in.; smallest, a little more than $\frac{3}{10}$ in.

C. castanea. Largest, a little more than $\frac{3}{10}$ in.; smallest, fully $\frac{3}{10}$ in. This species varies less in size than *C. piger*.

I do not remember having perceived any odor in the *Trichius eremicola*, but in the other it is constant. You may remember my having discovered one with you in a cherry tree in Dr. H.'s garden, merely by the odor diffused in the air. Both are found in great abundance on the chestnut trees of Round Hill. The largest *T. eremicola* when taken emits from its abdomen a milky fluid, which may have a smell, but I did not perceive it.

By the way, I have a new species of *Malachius* allied to the *quadrimaculatus* which I have described and named after you. That, and the description of two or three other insects, I mean to send to the Academy of Natural Sciences of Philadelphia.

HARRIS TO HENTZ.

MILTON, June 20, 1826.

I have been looking in the office every morning these four weeks for a letter from you, from which I should learn the result of your application for an appointment in Carolina.

I have not dissected your *Trichius vulpinus*, but am satisfied the insect is referable to the genus *Amphicoma*. Around Sweet Auburn, Cambridge, I spent several hours, and found many interesting insects, among them *Melolontha sordida* of Say. Another *Melolontha*, probably *hirticula*, being uniformly covered with hairs, and therefore distinct from *hirsuta*, which has the hairs disposed in lines, and from *balia* (the one I found on Round Hill) which has a transverse band of hairs between the eyes. These species are about the size of, and nearly allied to, our common species, *quercina*, and I propose to associate them with *pilosicollis*, *longitarsa*, etc., under the name of *Phyllophaga*, reserving that of *Melolontha* for those species which have seven laminæ to the clavola. I forget whether you have the *M. mœsta* of Say belonging to the genus

Apogonia of Kirby. Having found two specimens this spring, I can send you one if desirable. I have not yet met with *M. balia* here; the one found near Round Hill is the only specimen I have seen, and unfortunately that was imperfect.

At Cambridge I found *Malachius quadrimaculatus*, on the flowers of *Chrysanthemum leucanthemum*, but, though females occurred in abundance, I obtained but two males, distinguished by the singularly enlarged joints near the base of the antennæ; they confirmed the observation I had before made that the anterior tarsus of this sex has but four joints, whereas the intermediate and posterior tarsi as well as all those of the female have five joints to each; it was this circumstance that perplexed me in ascertaining the genus when my first specimen (which was a male) was discovered.

In the course of the next winter I propose revising and publishing my subgenera of the genus *Melolontha*, and any observations or new species you could send me would be very acceptable. It appears to me that *Trichius eremicola*, *scaber*, and the European *eremita*, should constitute a new genus, or at least a subgenus. These species are distinguished by the want of a hairy covering, and by having three teeth on each of the tibiæ, whereas in other *Trichii* there are but two, and the body is more or less hairy. Other diagnostic characters might be pointed out, but these are the most obvious. One important difference exists in their habits. The species in question are active only in the night, never found, like other *Trichii*, feeding (as the bees, which they often resemble, do) on the pollen and nectar of flowers during the brightness of the day, but secreting themselves in dark recesses, whence they emerge at night and fly abroad, probably to feed, like the *Melolonthidæ* and *Lucanidæ*, on the leaves of trees.

I had almost forgotten to urge you to visit Goshen, taking in company the lad who found the two specimens of *Amphicoma*, and solely for the purpose of finding duplicates of this most interesting insect. To Europeans it would be worth a journey of twenty miles, or even more, if certain of obtaining a specimen, and I think Mr. Say would be willing to walk that distance for the sake of finding one.

HENTZ TO HARRIS.

NORTHAMPTON, July 30th, 1826.

Mourn no longer for the solitude or singleness of your *Amphicoma vulpina*; I have found another, which, though rather darker in color, is a perfect specimen, and has its posterior tarsi. Those tarsi are like the rest, entire, equal, slightly toothed at their base. You shall see it when I go to Milton, along with a number of very interesting insects, among which you will see with pleasure two new species of *Melolontha* (new to me I mean); both are larger, or as long, at least, as any other American species; one is closely analogous to the *M. fullo* of Europe; do you know it? The other is covered with very close hairs over the elytra and thorax, and resembles no species which I know. I believe, with you, that the *Trichius eremicola* and *scaber* ought to form a new division; they differ in every respect from that genus.

I thank you for the characters of the genus *Malachius* given me by you. I think I will figure them all, as the male of the *M. quadrimaculatus* differs so much from the female. I have found two males this season, and observed the difference in the tarsi. I have another species of that genus which seems to be new also. If so, I shall have quite a paper upon that genus and the *Anthicus*. I have found one more specimen of my *Anthicus anchora*. Will you think of looking for that spider which you found on trees near the water? Observations on that subject would be highly valuable. It would be quite anomalous for that species to spin any web and abide on trees; as much so as for a *Cicindela* to feed on the nectar of flowers.

HARRIS TO HENTZ.

MILTON, Oct. 14, 1826.

Your favor of the 8th inst. was very acceptable. As to the new insects I sent you, I should be happy to have you describe them, particularly the Cicindelas, both those species and varieties named *varians*, and the other labelled *erythrogaster*; as you have permitted me to describe the *Chremastocheilus*, it will be no more than a "fair exchange," which you know "is no robbery." Indeed I shall be gratified if you will do it in your own name, merely indicating the place where, and person by whom communicated. On looking over Schönherr's Synonyms, I find the name *Cicindela varians* preoccupied. Schönherr places the name *varians* next to *sexguttata*. It is barely possible my insect may be the same, although it is not probable, and therefore I think you may pretty safely describe it as a new species, rejecting, however, the name *varians*, for which *denticulata*, *variata*, or *mutans* may be substituted. As you may not have time to compare this species with the *sexguttata*, I will endeavor to give you the result of my diagnosis. The other beautiful but small *Cicindela* has not a very appropriate name, and I should wish it changed for two reasons. First; it is a compound Greek term, and therefore not so strictly proper for a specific appellation, which, according to the best received rules now in vogue, should be in Latin. This rule, however, has not been much regarded. Second; the inferior is called *venter*, to which the Greek γαστήρ does not strictly apply. *Hæmorrhoidalis* is a better name, but perhaps you may select one more appropriate. I have given it the following characters in my notes.

C. (*hæmorrhoidalis*) brownish obscure; elytra with a humeral and terminal lunule, an intermediate sigmoid band, and two dots behind the band, white. Abdomen and thigh green, tail sanguineous. Length half an inch. Milton, Mass.

Description. Antennæ green at base. Head cupreous, with two green abbreviated lines between the eyes; mandibles white at base, black at the points; lip white, with a single tooth. Thorax cupreous obscure, with the margin and breast green. Elytra obscure, somewhat cupreous, lunules and spots greenish white. Abdomen green, terminal segments sanguineous. Thighs green, but obscure. I think it would be well to mention the occurrence of *C. formosa* of Say in Cambridge, Mass., first described from specimens brought by Mr. Nuttall from the Missouri above the Platte River. Also, that in the vicinity of Boston has been found *Clytus speciosus*, described by Mr. Say in Long's Expedition, as discovered on the banks of Wisconsin River, Prairie du Chien.

HARRIS TO HENTZ.

January 19, 1827.

From Dr. Pickering I learn that there is a great deficiency in material for the Journal of the Academy of Natural Sciences of Philadelphia, and having been chosen a correspondent I have sent on descriptions of our *Chremastocheili*. I have taken the liberty of giving your name to the species you denominated *piger*, and that of *Sayi* to the small one. Of this latter I made a good sketch of natural size, but neglected taking an enlarged drawing of it. My friend Pickering thinks that it would appear better to be represented enlarged to about thirteen-twentieths of an inch in length, and advises me to request you to make a drawing of that dimension. If you can send me one soon after the receipt of this letter, it will be forwarded with mine, and these three species will then appear on the same plate with the four insects which you described when in Philadelphia.

If you could assist the publishers of the Journal in this emergency by accounts of any of our undescribed objects of natural history, you will do them a thankful service, and they will furnish engravings for such drawings as you may send. I would suggest to you that among your insects are several which appear to be new, such as two species of *Cicindela*, two species of *Scraptia*, and one each of *Thymalus* and *Phryganea*. Two large species of *Melolontha* may possibly also be new, though I think it likely that one may prove to be *occidentalis*; it certainly is not *decemlineata* of Say as I once supposed. To this list you may probably add several more, or perhaps give a paper on our spiders.

If your avocations are such as to compel you to decline giving a necessary description of the above mentioned insects, I would be glad to add the two *Cicindelæ* and two *Melolonthæ* to a paper which I am now preparing. Of the *Melolonthæ* I made drawings and took full descriptions, while they were lodged in my hands for examination. In making this proposition I am actuated by an *esprit du corps*, a desire to uphold an institution which is in want of support.

HENTZ TO HARRIS.

Chapel Hill, N. C., Jan. 21, 1827.

Are you acquainted with *Lamia amputator?* Under almost every hickory tree here we find a vast number of twigs about the size of the little finger, which that insect has sawed from the tree, having inserted half a dozen or more of its eggs under the bark. The number must be prodigious; they injure these trees very much. The insect, I am told, has been described in the Linnean Transactions.

HARRIS TO HENTZ.

MILTON, March 10, 1827.

The only living insect I have seen since November was a minute *Tipula*, which is just appearing, and occasionally a lazy fly, roused from its winter's sleep by the sun and the heat of our apartments. Neither with *Lamia amputator* nor *Stenocorus garganicus* am I acquainted. We have, however, a small insect (*Stenocorus putator* Peck) which you have in your collection, and which is well known here as injurious to the oak, by pruning its branches. You may have an opportunity of ascertaining whether your insects proceed in the same manner. The female of *S. putator* deposits an egg on the limb, the grub penetrates to the pith, which it perforates to some extent, and when it has attained its growth it eats off all the woody parts of the branch at one point, leaves the bark only to support it, retires beyond the point of division, closes its aperture with castings of the wood, and remains at rest awaiting the winds of winter to bring it, with the amputated limb, to the ground; it then assumes the pupa state, and in spring emerges from the branch, and in its perfect state. Many undoubtedly perish from the violence of the concussion produced by this fall, but many still survive, to commence the work of destruction anew. The severed limbs, which are strewn in abundance on the ground, exhibit an appearance of having been removed by a saw, so regular is the point of separation; and by splitting these fallen branches at different times, the insect is observed in its various stages of larva, pupa, and imago.

For your beautiful drawings of the *Chremastocheili* I give you my best thanks; they will appear with a note on the species in the first number of the next volume. [They are published now for the first time. Pl. IV., figs. 4–6.] I examined the mouth of another specimen of *C. Hentzii*, which I obtained from Fenton's collections, and find the upper lip (*labrum*) very distinct. The figures of the trophi were from this specimen, and I trust will prove to be exact. [Pl. IV, fig. 7.]

I have lately received an interesting letter from Mr. Kirby, in which he makes some remarks on the species of *Chremastocheilus*. Some time since I wrote to him for Mrs. Peck, and sent to him, as I have before informed you, a specimen of the *Chremastocheilus* which we supposed to be the *castaneæ*. He says that he has seen the true *C. castaneæ*, which, according to figure and description of Knoch, has the thorax broadest behind, and that the specimen sent him must therefore be distinct. It is a matter of regret to me that this information was received too late to allow me to make use of it in my account of the species: but it will be communicated in a note accompanying the plate. Mr. Kirby further says that he has two other species, which he names; one, *C. canaliculatus*, is from Berkshire Co., Mass., and is the largest; the other is the smallest of the three, and is from Georgia; neither have been described. Mr. Kirby has subdivided the genus *Trichius* thus: — *T. fasciatus* is the type of *Trichius; T. hemipterus* of *Acantharus; T. eremita*, *eremicola*, etc., of *Gymnodus*, and *T. marginatus* of *Campapus*.

HENTZ TO HARRIS.

CHAPEL HILL, March 25, 1827.

I cannot as yet give you a full account of *Stenocorus garganicus*, of which, however, I have already a great number of specimens. The first found were discovered near the centre of a hickory log, in which they had made long galleries in the direction of the fibres. Those found lately in numbers flying near night are much larger, which circumstance would imply the possibility of their growing before they came out, as the first were found in winter. But the hickory and persimmons are attacked by another insect, which Mr. Mitchell thinks to be *Lamia amputator*. There is a figure of it in the Linnean Transactions; its color is a pale grayish-yellow, the elytra spotted with little red points. I have not seen the insect yet; but its ravages are too evident to be unnoticed by the most common observer. No less than thirty branches with their leaves have been counted under a single little bush. The number of these insects must be enormous, but their mode of propagating their species is different from that of *Stenocorus putator*. The female bores a hole through the bark of small branches for each egg, and having deposited five or six on these sticks she saws them off, or nearly off, and they fall to the ground, where they dry with the leaves on, whilst the parent stem is entirely destitute of foliage. How long the eggs remain in that state I know not; for even now I find them as they were last fall, just under the bark, which is slightly raised at that place, the aperture being closed with a thin pellicle. I will watch those which I preserve and give you the results of my observations.

You probably have in your collection a species of *Cicindela* which I gave you; it is from Pennsylvania; its color is a fine green, and its elytra have white dots and curved bands. By some mistake I had, till lately, thought it was described; but I am certain it is not in Fabricius, and Say has not mentioned it any where to my knowledge. Will you look at it, and tell me what you think about it; I will not send my paper till I hear from you. Since writing to you I have found among many other interesting insects another species of the same genus; it is allied to *C. marginalis* or *purpurea* of Fabricius and Olivier, and possibly Mr. Say would include it among the many varieties of that species; but I think it has a right to independence; the head and thorax are of the brightest green, and the elytra are bright purple, nearly crimson, with an abbreviated band and terminal spot. The edge is green as in *C. marginalis*, but the color much brighter; in a word, it is one of the most brilliant insects I ever saw; it is very common now, and I will send you specimens. In other respects it has the habitus of *C. marginalis*, and in its form differs from it only in having its thorax narrow and slender.

Can you furnish me with the descriptions of two species of a new subgenus of *Aranea*, published by Rafinesque in Kentucky? I have not his paper, but you may possibly find it in Boston; I forget even its title. He blundered into the truth in that instance, and I ought to quote him. Insects begin to swarm here, and few hours pass without making some discovery. I have now five or six species of *Clytus* not determined yet; one is beautiful. Dipterous insects are numerous, and I have beautiful specimens which I can hardly place in any genus, but it may be owing to my want of knowledge of that class, which I have but just begun to study. But what will you say when I tell you I have found three individuals of a fourth species of *Chremastocheilus*. It may prove to be the *C. castaneæ*, however, as it is entirely black, and the thorax somewhat narrower before. I will send you a design if you wish, and would have done so were it not that it would be too late for your paper.

I found to-day a fine *Notoxus*, a large immaculate species, with a yellow horn, but I lost it; I have no doubt I may find many to-morrow; it seems that insects of this genus, as of *Lytta*, feed on vegetables.

HARRIS TO HENTZ.

MILTON, April 9, 1827.

Many thanks, my dear sir, for your prompt reply to my last. Your history of the habits of *Lamia amputator* was new and interesting to me; it differs from all others of the capricorn tribe with which I am as yet acquainted, and will probably serve as a clue to others of the genus.

The great naturalist, MacLeay, who has departed both from the cibarian or maxillary system of Fabricius, and somewhat from the eclectic system of Latreille and Leach, in his arrangement of insects, which is called the Quinary system, has laid great stress on the primary forms of larvæ. "For the basis of his system he assumes a relation of analogy between the larvæ of insects that in the progress of their metamorphosis assume wings, and those that do not, which form his class, *Ametabola*, so that the prototypes of the former shall be found amongst the latter." I will not enlarge on the subject, which you will find well explained in Kirby's third and fourth volumes, and only introduce it now to recall to your recollection the name which you had forgotten, to show the importance which MacLeay's investigations will give to the study of the larvæ of insects, and to induce you to embrace every opportunity to ascertain and describe those with which you may become acquainted. Even in the wood-eating coleoptera great differences obtain in the appearances of the larvæ. Thus that of *Saperda* is entirely destitute of legs, while those of many other *Cerambycidæ* have six small ones. The larva of *Buprestis* is flattened, vermiform, apod, with an enormous head, while that of the only *Serropalpus* which I have seen, though flattened, is of the same width with six legs and an anal fork. It is found between the loosened bark of trees. The perfect insect very much resembles a *Cistela*, but is more slender.

In describing the *Cicindela* from Cambridge, you will please recollect that it was found on the sand near Sweet Auburn, in company with *C. formosa* Say. No other species appeared to frequent the place. The *Cicindela* which you gave me from Pennsylvania, I have always supposed to be the *decemnotata* described by Say in his American Entomology, Vol. I. No description, either in Fabricius, Schönherr or Say, agrees precisely with that of your other species, though *C. purpurea*, var. second, comes nearest to it. It must also greatly resemble *C. pulchra* Say. In considering it as a new species, I should be determined by the difference in proportions (e. g., you think the thorax is proportionally more slender than in *C. purpurea*); second, by difference in punctures, length of mandibles, number of teeth and punctures on the labrum, etc., if any difference is observable; third, by difference in colors and spots (e. g., that of the head and thorax, which in your insect are green; and the absence of the oblique band, which in *purpurea* never attains the external margin, whereas the abbreviated band in your figure appears to be rather a triangular marginal spot); and lastly, by distinctness of locality. On this head you would do well to observe whether your *Cicindela* is found isolated, and not in company with *purpurea* (which last I have never found except in dry pastures); and whether, if, aggregated with *purpurea*, it keeps itself unconnected with that species, uniting only with such as resemble it entirely in color and marking. You probably well know that the ♂ in this genus has the anterior tarsi dilated, with white pulvilli beneath, while that of the ♀ is slender and simple.

Your having met with another species of *Chremastocheilus* confirms Mr. Kirby's conjecture that we probably have several species of this genus. My paper has been published, and you probably have seen it. Since I wrote you I have seen the Zoölogical Journal for April, 1826, in which Mr. Kirby acknowledges the receipt of an insect of the genus from me, which he describes in full as the *C. castaneæ*, but which, as I have informed you, he subsequently considered as distinct. He describes, also, in the same Journal, the species from Georgia, by the name of *variolosus*. This appears somewhat to resemble *C. Sayi* mî, but no mention is made of the abundant hairs which clothe the latter.

In the note which I am to furnish the next volume of the Journal, which will also contain the figures of these insects, I shall propose a new name for the first species. Mr. Kirby has already redescribed and named it.

Your mentioning the habits of *Notoxus* and *Cantharis* (*Lytta*

Fabr.), brings to my recollection some observations made by DeGeer, Kirby and others, on a kindred genus, *Meloe*, which has been thought to be parasitic in the larva state, on certain flies (*Syrphidæ*) and bees (*Andrenæ*). Kirby observes that it is to be wished some skilful person would search for this larva by digging round the roots of the ranunculus, and other acrid plants on which the *Meloe* is found, that by discovering its larva this mystery might be cleared up. I have found *M. angusticollis* in great abundance on *Ranunculus bulbosus*, and intend to look for the larva. From the affinities of this genus with *Cantharis*, I am led to question the accuracy of the statement that the larva is parasitic, knowing as I do that the larva of *Cantharis* is subterraneous at the roots of plants.

No true *Chrysomela* of Fabricius or Say appears to answer the description of your large, yellow, black-striped one; hence I think it probable it will prove to be the *Doryphora decemlineata* Say, which is said to have the thorax liturate (not *litterata* as in Say), and each elytron quinquelineate with black. You will easily determine it to be a *Doryphora* by the shortness and breadth of the last joint of the maxillary palpi, as well as the projection of the sternum between the intermediate legs, whence the name of the genus. It is not found in this State.

After closely examining the *Geotrupes* in my collection, I find we may muster between us five species. I found among your duplicates one which, from the whitish powder covering the abdomen and legs, I suspect to be among the relics of your box of bran, put up in Carolina; please inform me if this be the case. The male of this species is black, the elytra with a purplish bronze, the thorax with a greenish lustre; the intermediate tarsi large and strong, terminated by two very large, falciform, incurved nails; the anterior tibiæ with the last or terminal tooth very small, but with a process extending forward, and terminated within by an incurved short tooth; the spine which covers the inner emargination very short. Spines of the posterior tibiæ very long. Striæ of the elytra not crenated or punctured. In form this species is more flattened than the others, and the thorax is proportionally shorter. The anterior tibiæ and intermediate tarsi of the female have the usual conformation and the colors of the only two specimens are less brilliant.

Second, probably *G. excrementi* Say, more convex than the others, thorax so gibbous as nearly to resemble a quarter of a sphere, more than one third the length of the body. Anterior tibiæ of the male, as in the first species; intermediate tarsi simple, spines short or moderate. Color black, polished, and slightly bronzed, striæ very slightly crenated within, beneath chalybeous black.

The third species in form more nearly resembles the second than the others; the body is not quite so thick and convex; color brilliant green, bronzed, sometimes cupreous, beneath bright chalybeous and light green; thorax proportionally stouter, body proportionally more oblong than in the second species, thorax not gibbous. Striæ with small punctures within.

Fourth species. Broad, convex, dark green. Striæ with deep, distinct punctures; club of the antennæ large, fulvous; anterior tibiæ of male, as in the second species, greenish-black beneath, with dense ferruginous hairs.

The fifth species somewhat resembles the second, but is smaller and less brilliant, and not so broad in proportion. Striæ of the elytra indistinctly crenato-punctate; club of antennæ small, dark brown; thorax with a longitudinal, deeply impressed line; beneath polished black, hairs minute and distinct.

Length of No. 1, $\frac{7}{10}$ in., breadth, $\frac{4}{10}$ in.; No. 2, over $\frac{6}{10}$ in., by nearly $\frac{4}{10}$ in.; No. 3, $\frac{7}{10}$ in., by $\frac{9}{20}$ in.; No. 4, $\frac{6}{10}$ in., by nearly $\frac{4}{10}$ in.; No. 5, nearly $\frac{6}{10}$ in., by $\frac{9}{20}$ in. and over.

HARRIS TO HENTZ.

MILTON, June, 1827.

Your specimen of *Chremastocheilus* arrived in due order; the head, however, was wanting, and the mentum was so much bruised as to leave me at loss to determine whether the jugular emargination was deep as in *C. Hentzii* and *C. castaneœ* (H.); or shallow, as in *C. Sayi* (H.) and *C. variolosus* Kirby.

Taking only the form of the thorax into consideration, *C. castaneœ?* (H.) may be characterized as having that part subquadrate, the lateral margin nearly straight and the tubercles prominent, subglobate. *C. Hentzii* (H.), thorax subquadrate, the lateral margin arched, the tubercles somewhat triangular, subacute. *C. Sayi* (H.), thorax transverse, a little broader behind the middle, suddenly contracted behind, lateral margin arched, tubercle slightly top-shaped or sub-tuberculate. Your Carolinian species appears to have the thorax transverse, conspicuously broadest behind the middle, then suddenly contracted; the lateral margin arched, the posterior tubercles large, turbiniform. But the following is the description I have drawn up from your specimen, and I would thank you to supply the deficiencies, correct the mistakes, and suggest any improvements which may appear proper.

C. ——, black, opaque, setose; palpi piceous; thorax broadest behind the middle; anterior tubercles very small, acute and incurved; posterior ones large, polished, turbiniform.

Head — Clypeus? Mentum? Palpi pale piceous.

Thorax one third wider than long, with sharp distinct varioles, and short whitish hairs; anterior tubercles very small, acute, incurved; lateral margin arched to behind the middle, where the thorax is much the broadest; behind this, on each side, a deep emargination, within which is situated a large, polished, turbinated tubercle. Elytra with oblong, distinct, setiferous varioles on the disk, and circular crowded ones on the margin; hairs long, yellow, depressed.[1]

Length nearly $\frac{8}{20}$ of an inch.

The tufts of ferruginous hairs within and beneath the thoracic tubercles and emarginations, as well as the small, umbilicated, anal tubercles, appear to be common to all the species of this genus.

You are certainly correct in separating *Chrysomela rhois* Forster, from the genus *Altica*, in which I had incorrectly placed it from its possessing saltatory powers. The situation of the antennæ does not correspond with that of *Altica*; and this insect, with your allied species, may, for the present, be placed in a subgenus of *Chrysomela*, forming the connecting link between *Altica* and *Chrysomela* in having the incrassated saltatorial thighs of the former with the distinct antennæ of the latter.

HARRIS TO HENTZ.

MILTON, Sept. 3, 1827.

Are you not tired of the name *Chremastocheilus?* Nevertheless, I will once more beg your patience for a few minutes. The very hurried manner in which I examined the Carolinian insects for which I am so much indebted to you, must excuse me for so readily taking the specimen of *Chremastocheilus* to be identical with the one forwarded in your letter. A more careful examination has nearly convinced me that it must be distinct. The specimen last received has the posterior tubercles of the thorax formed precisely like those of *C. Hentzii*; it has also on one elytra a whitish spot, which at first sight would appear to be fortuitous, but the microscope shows on the other a corresponding spot, which, cursorily examined, seems obsolete. I have found *C. Hentzii* in Milton, with the spots obsolete in the same way. Can yours be a small individual of that species? The specimen received in the letter is obviously distinct from the other; the thorax not only being much the widest behind, but the posterior tubercle rounded or top-shaped. This being the case, I am still ignorant of the appearance of the mentum, and will be greatly obliged to you to inform me whether the gular emargination is deep or shallow, and to note any other particulars in which in that part it may differ from its congeners. I am suspicious that this insect will prove to be the *C. variolosus* of Kirby, in which the notch of the back part of the mentum is very small, as in *C. Sayi*, and does not extend down to the bottom, as in *C. castaneæ?*, *C. Hentzii*, and your specimen. This can be ascertained without dissection.

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[1] What are the most characteristic differences between this and *C. Sayi?*

HARRIS TO HENTZ.

MILTON, NOV. 3, 1827.

It is an undoubted fact that in generalizing the characters of great divisions, as M. Latreille does, many insects allied by natural affinities must be included, which, in some one or two particulars, may form exceptions to the general definitions. That this may be the case in regard to the *Phengodes* I think is highly probable, as it is in that of other genera; but these exceptions, though embarrassing to the student, are of no consequence in a philosophical view. You may have observed that the *Pselaphi* are dimerous, yet are they most correctly arranged by Leach (in Samouelle's Compendium) and by MacLeay in the family of *Staphylinidæ*, to which they are obviously related by natural affinities. On the contrary, *Parandra* and some of the *Cucujidæ* are really pentamerous, yet are so closely related to *Tenebrio* that they preserve a place near them in the *Heteromera.*

Your figures of the mentum and thorax of *Chremastocheilus* were highly gratifying to me, and I shall duly acknowledge the favor when I describe the Carolinian species, which certainly is not the *C. variolosus* of Kirby, although I think *C. Sayi* may be.

In regard to the folding of wings in Hymenopterous insects, all I can say is, that *Leucospis*, all of the *Vespidæ* (except only *Ceramius*) and the *Masaridæ*, have them folded longitudinally, and no others to my knowledge. The way then to ascertain from the wings themselves whether the insect belongs to the *Vespidæ*, is to observe whether the nervures follow this type—one marginal and four submarginal cells, the fourth being apical and incomplete. With *Leucospis* there can be no doubt.

Ceramius, which is another instance of exceptions to general rules, is known by the extreme smallness of the maxillary palpi, which consist of only three or four joints, while those of the allied genera, *Eumenes*, *Odynerus*, etc., have six, and are nearly as long as the labial palpi. According to these characters, the two Hymenopterous insects which you sent me are *Vespidæ*: they are *Polistes*, because the mandibles are not longer than broad, are not prolonged into a beak, but have their apices truncated; because the clypeus is nearly quadrate, and the middle of its anterior margin produced into a little tooth, the abdomen oval (not conic,) and peduncled. The maxillary retractile appendages or tongues of your *Malthini* are really most singular and anomalous characteristics. I must, however, beg of you a full description of each species before I can feel qualified to determine the identity of one with *Cantharis bimaculata.* You may recollect that you gave me a specimen which you caught in Pennsylvania on the thistle. Two years ago I compared it with Olivier's description and figure, and marked it *Telephorus bimaculatus*, perhaps incorrectly. For the sake of future reference I will call it No. 1.

P. S. Before you publish the monograph on *Tenthredinidæ* allow me to consult for you Palisot de Beauvois, who has described several species, and who makes much use of the little hooks (*hamuli*) which hold the anterior and posterior wings together, in determining species.

HARRIS TO HENTZ.

MILTON, Feb. 26, 1828.

In my collection are about eighty species of *Carabidæ*, but I have not been very successful in determining species. Say's genus *Harpalus* is a kind of magazine for doubtful species, several of which have the apex of the elytra sinuato-emarginate, as you observe in that common and very beautiful species, *H. viridis* Say, or as Prof. Peck more judiciously named it (from its great variation of hues) *proteus*. I am not sure but that this species may prove to be the *viridi-æneus* of Beauvois, whose figure and description correspond very well to our insect. Another species, for which I am indebted to you, has the elytra also emarginate at tip. It is a large insect of an ochreous color, and I suppose it to be *H. pennsylvanicus* Say, though it does not agree entirely with De Geer's *pennsylvanicus*. It certainly is a *Harpalus*, according to Say, for the male has the anterior and intermediate tarsi dilated; whereas in *Feronia* only the joints of the anterior tarsus are dilated in the males. Say's genus *Feronia* is nevertheless a heterogeneous mixture, a complete *pot-pourri*, out of which several natural genera may be rescued. *Feronia impuncticollis* Say, is a true *Zabrus*; the distinguishing character of that genus is to have the spine, which arms the apex of the anterior tibia within, trifid or triple; *Harpalus rusticus* is also a *Zabrus*, while

Feronia obesa Say, which resembles the latter in form, and is a larger species than *F. impuncticollis*, but so much like it as hardly to be distinguished, belongs, with it, to *Amara* and is destitute of the triple spine.

HARRIS TO HENTZ.

MILTON, June 17, 1828.

Buprestis femorata Fabr., differs from the species marked *characteristica?* Herbst, in many respects. The distinctive characters of *B. femorata* appear to be, face plain, with two large metallic impunctured raised spots; body slightly convex, the impressed portions of the elytra metallic, distinctly and densely punctured, serratures of the elytra minute.

B. characteristica? Face divided by a transverse line between the eyes, the inferior portion below the level of the superior, which seems to lap on it like a cap; metallic facial spots very small or obsolete. Body more dilated, more depressed than in *B. femorata*; elytral impressions not very distinctly metallic, nor so densely punctured; serratures very obvious, especially at tip. Color tinged with purplish brown. The first character alone, viz.: the division of the face by a transverse line, is sufficient to separate the two insects.

I have examined *Telephorus bilineatus*, and observed that the maxillæ and lingua were so soft as to yield on pressing the abdomen, and jut out into *caruncles* from what appeared to be a crowd of the fluids; whether these parts are susceptible of voluntary dilatation I cannot determine. My friend, Mr. Leonard, has promised to send me a quantity of duplicates from his parish in Dublin, N. H., near the Grand Monadnoc Mountain. Many among those which I have already received from him are entirely new to me. Mr. Leonard is indefatigable in studying the habits of insects, and very successful in raising them from the larvæ. Through him I have ascertained the larvæ of many species in my collection, and particularly of the Lepidoptera.

HARRIS TO HENTZ.

MILTON, Sept. 4, 1828.

On the 30th of July I obtained another specimen of the *Dolomedes* described to you in my letter of August, 1824, and of which you have the individual then found. The second was discovered on the top of a high bush, near a running stream. It forms a large, irregular, loose, horizontal web, at one extremity of which was situated its follicle or egg-bag, covered with the young. The parent appeared watching them at some distance. Unfortunately the insect was subsequently lost, but not till after I had compared it with a drawing I had made in 1824, [Fig. 1], with which it entirely agreed. It is not a little singular that after looking every year in vain for this spider, I should at length discover it within fifteen days of the same time of the year, and within a stones throw of the same place where the first one was observed. You considered it as paradoxical that this spider should inhabit bushes, and make a web, and I was therefore unwilling that you should take my word for it, until further examination was made. You may now be assured that its location was not fortuitous, but a matter of choice, and consistent with its economy.

Your attempt to procure a correspondence for me with Professor Germar, is a very acceptable service; there is no European, perhaps, who could better furnish information respecting the modern genera of the nocturnal Lepidoptera than that distinguished entomologist. This branch of the science is, you well know, particularly interesting to me, and has received much of my attention. I have already distinguished sixteen subgenera of the *Bombycidæ*, five of the *Arctiadæ*, and several of the *Noctuadæ*, and have completed accurate drawings of the nervures from specimens in my collection; and I delay completing my labors in this department only till I can obtain a better knowledge of the larvæ and their habits; for where a marked difference obtains in these I have found a corresponding difference in neuration; and on these principles united (together with other easy characters taken from the imago), I should wish the genera which I may propose to be established.

The small *Chremastocheilus* you sent me last summer, which had white spots on the elytra, and appeared to be a variety of *C. Hentzii*, is certainly a distinct species, and comes nearer to the *C. castaneæ* than any other I have seen. Knoch remarks that such spots existed in a specimen which had not been rubbed. The form of the posterior part of the thorax and its angles and punctures are different from those of *C. Hentzii*, although it resembles it so closely in many respects. The one you sent me in a letter also somewhat resembles the *C. castaneæ*; but from Kirby's figure and description of the *variolosus*, I judge it to be identical with the latter. Kirby has described *C. Hentzii* by the name of *C. canaliculatus*, but besides his not noticing the white spots of that species, his description was posterior to mine, and your name must be retained as the specific designation.

C. castaneæ? mî, Kirby calls *C. Harrisii*; it is certainly most distinct from the true *C. castaneæ* of Knoch.

HENTZ TO HARRIS.

CHAPEL HILL, Oct. 24, 1828.

I thank you for your very accurate design of the *Dysdera*. I have now one hundred and four drawings of that family, and think I have not more than two thirds of our American spiders. The circumstance of your finding the young with the

Dolomedes, renders the fact of its making a web less strange, as the insects of that subgenus are known to spin some threads in the shape of a little tent, at that time; but none as yet has been observed to make so regular and extensive a web as you describe.

My genus *Macrosiagon* is composed of the following insects: *Ripiphorus dimidiatus*, *R. limbatus*, and *R. tristis* of Fabr. The remarkable elongation of the upper lobe of the maxillæ is the chief character of that proposed division. These are the characters: Family *Mordellides*, genus *Macrosiagon* (*Ripiphorus* Bosc, Fabr.). Tarsi with all their joints simple; palpi subfiliform; antennæ pectinated; maxillæ with the upper lobe filiform, longer than the palpi; scutellum not apparent; abdomen abruptly truncated; elytra dehiscent, longer than the abdomen. What is really unaccountable to me is that Fabricius, who saw every one of these insects, should not have examined the mouth of any of them. It is strange that the Germans should so long cling to the system of a man who certainly imposed upon himself, if he thought it sufficient or true.

I have just found vast quantities of an insect, the larva of which feeds on the beans of the *Gleditschia triacantha*. It is a *Bruchus*, which must be closely related to *B. robiniæ* Fabr., if it is not that insect, but it does not feed on the locust. It is twice as large as the *B. pisi*, though some specimens are not larger, and the elytra cover nearly the whole of the abdomen. Do you know it? In Abbot I observed a plate representing a moth, which at once brought to mind your *Arctia pseuderminea*; and in looking over your delineation I find but slight differences; still, as I have not studied this subject, I may be mistaken in supposing it to be the same. Abbot's insect, which he calls *Phalæna acria*, is considerably larger. I have observed, however, that insects in the South are very much larger in many instances than the same species in the North.

HARRIS TO HENTZ.

MILTON, Nov. 19, 1828.

Your dissertation on the culture of silk came safely to hand, and after reading the papers I sent them to my friend, I. M. Gourgas, a German by birth, who is zealously engaged in promoting this pursuit. My honored mother has raised silk worms for more than ten years, and supplied herself with all her sewing-silk from their labors. On my fathers place are many of the white mulberry trees, which are found to produce the best silk. Mrs. Harris never raises but one crop in a year.

Having been repeatedly called upon for entomological communications in the "New England Farmer," I have concluded to publish in it some of my manuscript descriptions, with the addition of popular remarks. Several numbers have been printed, which I send you as a sample. The next communication contains eleven new *Dyticidæ.* This will be followed by some of the *Elateridæ*, including two new subgenera of my own, viz.: *Nothora*, containing the species with pectinated nails; and *Tapheicerus*, in which the suture between the *ora* and *antepectus* is dilated to receive and bury the antenna. In this subgenus the antennæ are very short, the thorax is gibbous, and the body is very much covered with scales, or short, flattish bristles; though nearly related, it differs from *Eucnemis* Ahr. and Mann., in which the mouth is entirely retracted, the antennæ very much approximated at base, the prosternum very short, so that the power of leaping is weak; and the posterior coxæ very much dilated, so as to conceal the greater part of the thighs.

I am aware that the "New England Farmer" is not likely to be much circulated among men of science, and therefore will not be considered the best authority; but it is a convenient vehicle at present; and, such is the ambition of European entomologists to anticipate Americans, that I willingly yield to the solicitations of several friends in publishing what may possibly contain many new species; and, in doing so, I am not actuated so much by personal considerations as by a desire to aid several young entomologists in this vicinity, and by the wish to promote American science in general: *pro patria.* The "Farmer" is taken at New Harmony, and will therefore come under the eye of Prof. Say: it is my intention, after these descriptions shall have undergone his rigid scrutiny, to republish them, either by themselves, or in some respectable scientific journal.

HENTZ TO HARRIS.

Chapel Hill, Dec. 3, 1828.

The mark (?) which you find on some of my insects indicates that they may differ from the one marked without it in my collection. Thus, till just now, I was in doubt about 133 ? My No. 133 I caught in Northampton and marked *E. marmoratus.* Last spring I found 133 ? in vast numbers in February, under the bark of decayed pine trees; and finding great resemblance with the former, I marked it as you have it. Now, in order to answer accurately your letter, I gave it a careful examination, and discovered this remarkable difference, that whilst my 133 ? and 163 have, besides a dilated suture for the antennæ, a distinct and deep groove between that and the edge of the thorax for the reception of the tarsi, when at rest (see Fig. 2), No. 133 has nothing like a groove for the tarsi. The bristles of this are silvery white on the elytra, but become of a golden yellow, as in 133 ?, as you advance towards the head. Besides this, those bristles or scales form two oblique lines near the end of the elytra, which are obsolete or wanting in 133 ? If I were you, however, I would not add 133 to your genus *Tapheicerus*, as the want of the groove may be a good character to make another subgenus of that

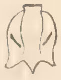

Fig. 2.

enormous genus *Elater.* It is probable that 133? is the one described by Fabricius. *Elater pennatus* is very common here —at least I have thus marked one which is black, with the head and thorax of a golden orange color, and the disk of the thorax black. It is congeneric with 133, having no groove for the reception of the tarsi. But the suture for the reception of the antennæ is very distinct.

[In Hentz's MSS. Catalogue, in the possession of the Society, No. 133 is named *Tapheicerus excissatus*; No. 133? *Elater pennatus* Herbst and No. 163 *Tapheicerus februarius.*]

HARRIS TO HENTZ.

MILTON, MASS., Dec. 19, 1828.

Your extract in a former letter from the article on *Morio*, with Palisot de Beauvois's figure and description of the *M. Georgiæ*, will suffice for the present. But you will please inform me whether you consider your No. 740 as appertaining to the genus in question. It is a much smaller insect than that figured by Beauvois, and is found in the Middle as well as the Southern States. [It is marked in Hentz's MSS. Catalogue as *Cratacanthus pennsylvanicus* Dej.]

Your plan in regard to dividing our labors in Entomology is certainly a judicious one. Prof. Say appears tacitly to have resigned the *Araneidæ* to you, while he has left little to be done with the Diptera. There are several reasons, however, which will not permit me to enter fully into a farther division at present, though, in declining your proposal, I have to encounter many compunctious visitings on the scores of friendship. And now, my dear sir, I will tell you my reasons, which I hope will exculpate me from any inclination to disoblige. It has long been a favorite project with me to publish at some future time a little work like Dr. Bigelow's *Florula Bostonien-*

sis, but with plates. The title contemplated is: "*Insectorum Faunula Bostoniensis*," including, with few exceptions, the common species to be found in this vicinity.

Notes and descriptions of about five hundred *Coleoptera* were made for this purpose, and my leisure moments last winter were devoted to the study of the *Hymenopterous* genera, with the assistance of Jurine's incomparable work on that order, the introductory plates of which I copied. The great work of Stoll', which I have consulted, affords a clue to the *Hemiptera*; and in the publications of Meigen, Wiedemann and Say, the *Diptera* will be done to my hand. In the *Lepidoptera* a most patient investigation of the nervures, palpi, antennæ and larvæ, has been made in order to elucidate this intricate and confused section of insects. From Dr. Pickering and yourself I hope to receive in due time the results of your investigations in the departments which have occupied your attention. Any of our northern insects, which you may think proper previously to describe, will most readily be introduced, and due credit given. However inadequate to the undertaking, I have entered upon it with the conviction that something of the kind was wanted, and would be useful to others. You were apprized of it in letters dated August, 1824, and May, 1825; it has been mentioned to several who approved of it, among others Mr. Oakes, Rev. Mr. Leonard, and Mr. Greenwood, who have offered the use of their insects; those of the latter comprise the often mentioned collection of Mr. Fenton, containing twenty-six hundred species found in Connecticut and New York.

The third volume of American Entomology I presume you have seen, as it has been printed several months. Prof. Say's *Hipparchia semidea* appears to be the *Papilio fortunatus* of Fabricius. I have a specimen from the White Mountains, N. H. The little grooves in the *ora* of *Tapheicerus* for the reception of the tarsi had not escaped my notice, and you will also find that the posterior angles of the thorax are excavated beneath to receive the femora and tibiæ when folded together.

The following very brief characters may enable you to distinguish the species which I have, if in your collection. No one of them has the scales disposed in two oblique lines on the elytra, as in your 133, which I have not seen; nevertheless, in the species here numbered 1, the lines may have existed, though now obsolete. Will you inform me whether it agrees in other respects with your 133. It will not be necessary for me to publish your Nos. 133? and 163, and I only proposed it on account of the paucity of species in the sub-genus which I proposed to illustrate.

1. Fuscous black, punctured; varied with ochreous and black oval scales; thorax tri-foveolato-indented on the disk, posterior angles robust, incurved at the points, mentum very much produced and rounded in front beneath the mouth; tarsal grooves obsolete. Length $\frac{11}{20}$ inch.

2. (your 133?) Brownish black, punctured, squamose; thorax canaliculate, posterior angles excurved; elytra substriate. N. Car. Length $\frac{13}{20}$ inch.

3. Black, punctured; variegated with pale yellowish and black cuneate scales above, and with silvery white, short, flat bristles beneath; thorax canaliculate, posterior angles nearly rectangular. Length a little over $\frac{1}{2}$ inch. Dublin, N. H.

4. Dark chestnut, punctured; thorax covered with yellow oblong-ovate scales; elytra with paler cuneate ones; body beneath with short flat white bristles; thorax canaliculate, posterior angles excurved. Length $\frac{9}{20}$ inch. Dublin, N. H.

5. (your 163.) Castaneous, punctured, setose; thorax elongated, canaliculate, posterior angles excurved; elytra striato-punctate. Length nearly $\frac{2}{5}$ inch. N. Car.

6. Black, punctured; head and sides of thorax with brilliant reddish-tawny flattened bristles; elytra with black, and body beneath with white ones. Length nearly $\frac{9}{20}$ inch. Can this be the *pennatus* of Fabricius? The thorax is not canaliculate, nor the elytra striate.

Your number 410 appears to be *Necydalis thoracica* Fabr., and No. 90 apparently differs only in size from *Pæderus riparius* of the same author, yet it may prove to be a distinct species from his which I have received from Russia. [It is marked *Pæderus littorarius* in Hentz's MSS. Catalogue.] This reminds me that the Russian specimens of *Dermestes lardarius* are very inferior to ours in size. Gmelin describes a *Bruchus gleditschiæ*; and has called the *Brentus* you sent me *Brentus Druryanus*; it is found here under the bark of prostrated logs.

December 21.

P. S. On Saturday afternoon I received between five and six hundred Coleoptera from my friend, Mr. Leonard, of Dublin, N. H. Among these is an *Elater* which nearly corresponds with your 133; it has, however, only one oblique line of yellowish scales on each elytron. I think it is the male of the first described in this letter, having an oblong indentation on the posterior disk of the thorax, and a small round one on each side in front of it, and much more conspicuous than in the other sex. I forgot to notice that in the first five species, the feet were more or less brown, and in the last blackish. I have reëxamined *Helops obliquatus* and the allied species, compared them together, with another specimen from Dublin, and with several *Helopi*, and have come to the conclusion that they neither belong to *Hallomenus*, nor are strictly admissible into the genus *Helops*, though Fabricius and Latreille include one of them in the latter. They seem to possess characters requiring the formation of a new genus for their reception. Some slight differences are visible in the sculpture of the elytra of these two species, but they are easier seen than described. The female of the one with naked scutel, has antennæ precisely similar to those in the same sex of *H. obliquatus*. Beauvois has justly remarked that there is no sense in this specific name imposed by Fabricius, there being no obliquity observable about this insect. The above mentioned insects from the New Hampshire hills are valuable acquisitions, and many of them are new to my collection. The following species are unique and highly interesting.

A. Pentamerous. Trophi porrect, mandibles large, broad at base, or triangular, apparently simple and obtuse at tips; palpi with obconic joints, terminal ones largest, rounded at tips; antennæ 11-jointed, first joint obconic, second globular, third largest, obconic remaining ones submoniliform, or very short obconic, terminal ones ovate. Very dark castaneous above, badious beneath; densely punctured, holosericeous with short decumbent yellowish hairs. Head nutant; eyes large, globose, almost meeting beneath, emarginate in front above the insertion of the antennæ; the latter with the palpi ferruginous; posterior part of the thorax deeply indented each side; feet slender, tarsi elongated, joints undivided; nails simple. Belongs to the *Cebrionidae*, genus *Boscia?*

B. Heteromerous. Brown, inclining to a pale snuff color, scabrous with black tubercles; antennal joints short obconic, first largest, last three transverse, forming a club, terminal one small, truncate at tip; palpi with obconic joints, terminal ones ovate, acuminate; mandibles grooved or bifid at the points. Head retracted to the eyes; thorax with two large tubercles in front, one on each side, and two elevated sinuated lines extending from the middle to the base; wings none; coleoptra with irregular series of deep foveoli, on each elytron a short elevated line from the middle of the base, a longer one on the disk, a submarginal one, two tubercles before the tip, the inner one very much elevated, and a small one on the tip; external margin embraces the body. Joints of tarsi undivided, equal, short, except the last, which is about twice as long as the preceding one; nails strong, curved, simple. Inhabits decayed wood.

C. Apparently tetramerous. Polished, body ferruginous; antennæ and feet paler; head black; thorax reddish, a black dorsal fusiform spot, extending from the base to near the tip; elytra pale reddish, a dilated fascia across the middle, and an apical one black. Antennæ slightly hairy, 11-jointed; first joint obconic, large, second to eighth (inclusive) small, subequal, moniliform, last three dilated, transverse, convex above, slightly concave beneath. A fascicule of hairs beneath the apex of each tarsal joint, excepting the last, which is largest; nails simple. The natural situation appears to be between *Phloiotribus* and *Cerapterus*.

D. A *Cistela.* Fuscous, pubescent, elytra with punctured striæ; feet fulvous; last joint in the anterior tarsi elongated, dilated towards the apex, flattened or foliaceous. Tarsi of the female simple.

HENTZ TO HARRIS.

Chapel Hill, N. C., Jan., 1829.

When I come to examine my *Tapheicerus* No. 133? with No. 133, I wonder how I could have supposed them to be the same species, but when I made my catalogue I had but little leisure. Your description marked No. 1 [in letter of Dec. 19, 1828], does not quite seem to correspond with 133, which is nearly $\frac{13}{20}$ inch, and has silver white scales on the elytra that become yellowish, however, near the base and golden on the thorax and head. The thorax I would describe by saying that it has two elevated ridges rather than that it has three grooves, because, although there are indeed three depressions, the ridges do not quite reach the base, and they have a widening space at base between them. The mentum, as in yours, is very much produced. This, the outline of the insect, though roughly made with the pen, will give you an idea of the

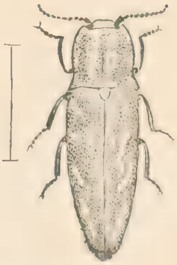
Fig. 8.

proportions. I have but four species of your genus *Tapheicerus*, namely, the one here represented, No. 133 ? and No. 163 ? which does not seem to differ from No. 163 of my catalogue, and lastly, *E. pennatus*, which varies in size from $\frac{9}{20}$ to nearly $\frac{1}{2}$ inch. Those described in your letter are not known to me.

No. 220 has affinities to *Malachius* and belongs to the tribe *Melyrides* of Latr., but must constitute a new genus, which I will publish as soon as possible. It has caruncles like *Malachius*, but we cannot place it in that genus with propriety.

No. 250. These are my notes on this insect, which I call *Necrophorus æqualipes* in my catalogue. "Characters in which it is distinct from *N. vespillo*; margin of elytra yellow; trochanters with acute spines; elytra glabrous; posterior tibiæ slender; frontal yellow spot narrow."

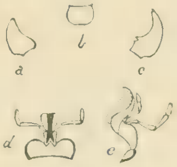

Fig. 4.

As I am still in doubt about 740, I will give you here a delineation of the trophi of that insect which I have dissected. You will observe that the right mandible differs from the left.

The four insects you have described in your letter are entirely new to me. *A* is probably a *Boscia*. *B*, as far as I can judge, would seem to come between *Bolitophagus* and *Diaperis*. I cannot make anything of *C*, which you have described admirably. I do not know your *D*.

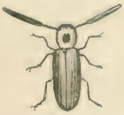
Fig. 5.

I am more troubled with the *Tillidæ* than with any other family of insects. You aided me much in a former letter, but I have several species which cannot be arranged under any genus. One, which seems to come between *Tillus* and *Clerus*, has the last joint of the antennæ nearly as long as the elytra. It is flat and oblong. The insect has something of the habits of *Priocera* of Kirby. The other might be a *Cylidrus* were it not for its filiform antennæ. Its tarsi have five very distinct joints and the penultimate is deeply bifid. It is marked 874. [874, Hentz MSS. Cat. = *Priocera undulata* Say.] I do not know whether you can make out anything by these wretched scratchings of my pen; but if you can, I would like to have your opinion, for neither answers the description of *Priocera*, and yet neither can be referred to any genus that I know.

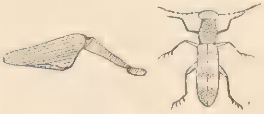
Fig. 6.

HARRIS TO HENTZ.

MILTON, January 16, 1829.

Your 874 has the number of tarsal joints, the palpi, and form of *Tillus*, as defined by Latreille and Leach, and the antennæ do not greatly differ. Those of *Tillus* are stated to be "subfiliform," although they are also somewhat serrate towards the ends, but probably not more so than in many *Elaters*. For the present, then, No. 874 may be considered as a *Tillus*. You mention a genus by the name of *Cylidrus*. By whom was it established, and where is it defined?

Your *Tapheicerus*, No. 133, figured in the letter, agrees in many respects with mine (No. 1) found in Milton, and lately received from New Hampshire. The thorax is not grooved in my insect, but has an oblong indentation on the posterior half of the disk, and the male has two smaller round ones in front of it.

Your insect measures $\frac{1}{15}$ in. longer than mine, and the thorax does not seem to be quite so broad before the middle. In mine the scales are not white nor so regularly disposed as in yours; but this may arise from the effects of time and rough usage. The trophi of 740 apparently resemble those of *Morio*

— but I may be mistaken, and after all the insect may be a *Feronia* or *Badister*. I have sent you the insect figured in my last. Mr. Oakes found one on tree fungi on the sides of the White Mountains, N. H., and Dr. Pickering, who has the specimen, supposed it might be a *Boletophagus*. The eyes are reniform and undivided; in *Boletophagus* and *Diaperis* they are globose and bisected by a projection of the anterior orbit: the antennæ are much like those of *Cossyphus*, the terminal joints forming a club precisely similar to that figured by Duméril, but the basal joint is shorter and larger, and the intermediate ones shorter; the nails also are simple. The name of *Eledona* has the priority and should be adopted instead of *Boletophagus*, and therefore no confusion can arise if I call my insect *Boletobius montanus*. You will also receive the *Cistela* described in my letter which may be called *manicata*, or, with gauntlets, for these are appropriated to the male sex only. Also a *Buprestis*, described by Prof. Say as the *maculiventris*, the extremity of the arm of which (anterior femur) is furnished with a long acute spine directed backward, just as a Spaniard conceals his stiletto. This insect is the type of a subgenus, which I call *Xyphephorus*, literally, assassin. Also several *Elaters* new to me, but common in the high regions of New Hampshire. The northern part of New England has been less explored by entomologists than any other part of the United States east of the Mississippi; and hence in this high, wooded, and uncultivated region, many new species will probably be detected; and I am most happy in having so excellent and friendly a correspondent in that quarter.

Do you ever set traps for insects? The idea was suggested by an observation of Mr. Leonard, who says that he obtains many curious insects that *get stuck* in the juice which oozes from the sugar maple of New Hampshire. A mixture of molasses and gum water in a shallow plate might allure and retain many small Coleoptera. Beating the trees is another good method. In this way I have caught on a white cloth, or in an inverted umbrella, many insects which would otherwise escape observation. A covering of white silk for the umbrella would be best; and it would also make the best screen against the heat of the sun. Numerous small beetles may be taken by sweeping the grass, or trailing over it a deep bag net. A wide mouthed bottle partly filled with meat, and suspended in a tree, would be likely to entrap *Necrophori*, *Silphæ*, etc.

Dr. Pickering wants to know what peculiarity in habits is caused by pectinated nails. Can you aid him and me in this question? My observation tends to this explanation which I suggested to him. The *Lebiæ*, *Cymindes*, *Nothoræ* and *Cistelæ* are all anthophagous in their perfect state, and may possibly use these little combs to gather pollen, or to cleanse their bodies when covered with it. Although spiders, which have two of their three claws pectinated, use these organs in keeping separate the threads of their webs, we do not know that the above named Coleoptera are furnished with *serictera*, silk secretories, or *fusuli*, spinners for the manufacture of threads. Indeed *Hydrophilus* is the only coleopterous insect known to fabricate such tissues, which it uses for the protection and envelopment of its eggs. The nails in this genus are not pectinated. I have also observed that the insects with fissile, bifid, and dentated nails were phyllophagous in the perfect state, for example, the *Melolonthæ*, *Telephorus*, etc. We know that the former, which in the division of the nails makes an approach to the pectinungulated Coleoptera, do not manufacture silk, nor enclose their eggs in a web. The nails, then, most probably are thus cleft or toothed, for some purpose connected with their manducation, perhaps to tear the leaves before they are eaten, or to retain the insect more firmly upon them while feeding.

I shall call the insect *C.*, in my last, *Ropaloceros fasciatus*; the name of the genus being taken from the singular bat-shaped antennæ.

HENTZ TO HARRIS.

CHAPEL HILL, N. C., Jan. 19, 1829.

Your letter, dated Jan. 16, arrived this morning, and gave me great pleasure. Latreille says about Tillus: "*Où la majeure partie des antennes est en forme de scie.*" In my 874 the antennæ are filiform, the last joint only being large and fusiform. That is the reason why I did not place it in that genus. *Cylidrus* is the name of a genus established by Latreille, I know not in what work, given in the Dictionnaire classique d'histoire naturelle thus: "*Tarses de 5 articles distinctes; antennes fortement en scie, depuis le 5^me article inclusivement; le dernier des palpes très long; celui des maxillaires de la grosseur des précédens, cylindrique; le même dans les labiaux en forme de cône renversé et allongé; mandibules longues et croisées; tête allongée, corps long et cylindrique. Ce genre se compose d'une seule espèce, Trichodes cyaneus, Fabr.*"

The antennæ of my insect, it is true, do not agree, but I have another species marked in my catalogue 860, where the antennæ are "*en scie depuis le 5^me article inclusivement,*" and this closely related in every other particular to 874; only the mandibles seem to be longer, which would be an additional character to place it in *Cylidrus*. I say "seem to be longer," because this being a unique, I have not dissected it, but the mandibles are certainly crossed. I am still in doubt about these two insects, and shall be glad to receive your farther suggestions about them. Your *Tapheicerus* seems different from my 133. The groove is not so deep in front, it is true, as at base; but when you turn the head towards you the outline of the thorax presents a perfect bow. On the subject of the *Cicindela* of Pennsylvania, I will extract the following from my journal: "No. 3. This can scarcely be the *decemnotata* of Say. The front is not hairy, the bilobate disk of the thorax not cupreous, the scutel not blue; elytra green all over. The refracted band of the elytra does not terminate in a transverse line with penultimate spot. Say insists on the differently colored margin, as in *C. purpurea*, which is not visible in this. *C. decemnotata* is said to inhabit *sandy alluvions* of the Missouri; this is always found on mountains. It must be a new species, and may be called *Cicindela montana.* I have never found it here, but Mr. Mitchell brought me a phial full which were taken near the Pilot Mountain.

This is an extract from my journal on *Feronia* 49: "This cannot be *F. limbata* Say, if his description be correct. This is much larger, and has some punctures on the marginal interstitial line. It must be related however to Say's insect, and may be the same." [49 Hentz MSS. Catal. = *Agonum palliatum* Dej., *limbatum?* Say.]

No. 799 is probably *Clivina pallida*, badly described by Say. It is found as his was, under the bark of decaying pine trees, and stinks exquisitely when alive, and for a considerable time afterwards; I know of no insect that has a worse smell. There is no "marginal series of short transverse lines" that I can see, but impressed dots, such as are seen there in so many insects. When recent, the insect has on its elytra several dark lines which are curved in the following manner. I think, notwithstanding these lines, that it is not *C. pallipennis.* The size, which is very uniform in all the specimens I have caught, does not correspond with the description of the latter, and the body is not black. If you strike out the word *deeply* before *impressed punctures* in Say's description it will apply perfectly well to my 745. I think it must be that insect. It is extremely common here in Boleti, or decayed wood. The following is an extract from my journal on the subject of 754, the last of those on which you wish for information: "754. *Uleiota* Latr. (*Brontes dubius?* Fabr.). The male of this insect has an anomalous projection of its mandibles which has not been mentioned by naturalists, at least to my knowledge. The mandible which is simple in the female,

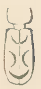
Fig. 7.

has on the male an outer projection which exceeds it in length, as in the figure. That piece is an apophysis, not connected to the mandible by a joint. The male probably uses it to hold and secure the female. I have not seen them in the act of uniting, but have often found them already in sexual connection; they seem to remain some time in that state. The male is not above the female, but they are connected end to end, the heads in opposite directions. Found in great numbers in March under the bark of decaying pine logs. It is doubtful whether this is the *B. dubius* Fabr., the apex of the elytra being rufous, and these are not black, but piceous or obscure.”

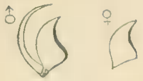

Fig. 8.

By the by, can you explain the confusion which exists about this family? Duméril places his *Cucuje ou Bronte testacé* in his family of *Omaloides*, then he gives the *Cucuje pattes jaunes* in his *genres anomaux Tetramères*! so that we find the same genus not only in different families, but in different divisions. Latreille mentions no anomaly of that kind so far as I know; and yet I am induced to think that some pentamerous species must have been in Duméril's hands which led him to make that mistake, because I have an insect which is pentamerous and which I cannot place near any genus except *Cucujus*. It is also related to *Trogosita*. I have it numbered 762. The head is not triangular, and the eyes are not remarkably prominent, but it resembles very much the insect you named for me *Cucujus flavipes* Oliv.

I have made no observations which could add anything to yours on the subject of pectinated nails, except that most of the insects that I know, with that peculiarity, are nocturnal or crepuscularian in their habits. The beautiful and very large *Lebia grandis* which I have described, is never seen but at night, and its nails are remarkably pectinated.

I have not set traps yet, but will avail myself of your suggestions. This reminds me that in France, in almost every garden, a number of flower-pots without a hole at the bottom are sunk in the ground so as to be even with the surface, and then nearly filled with water. Myriads of insects, injurious to plants, are caught so, but unfortunately one of the insect destroyers is the chief sufferer; I mean *Carabus auratus*, which the gardeners think very injurious to the roots of vegetables.

Can you tell me what to make of my 807, the tarsi of which are so anomalous, being 3, 4, 4? And yet I think the insect should be regarded as heteromerous. (It is indeed heteromerous according to etymology, but not as we understand it for coleopterous insects — 5, 5, 4.) I have three more species which are congeneric, but the anomaly seems to be sexual, one of the sexes being tetramerous. [807 Hentz MSS. Catal.= *Mycetophagus punctatus.*]

I have sketched here an insect which I have marked *Rhipicera.* I never found but one. It is undoubtedly rare here. Do you know it? Its color is a little lighter than that of *Platycerus securidens.* The pulvilli are pale yellow. The antennæ are supported on a peduncle. The thorax has a double impression each side in front, which is separated from the other by an elevated line; this line presently disappears, and in its stead an impressed line, which is obsolete at base, is seen on the disk. The elytra are very much punctured, interstitial spaces forming at least three somewhat distinct lines; the other spaces are irregular, or not continued. The insect is a female. The male has probably the antennæ *en panache.*

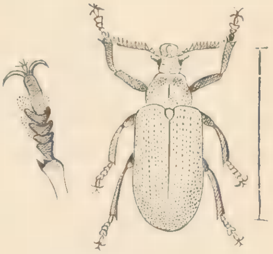

Fig. 9.

You remarked on 814 that the palpi, in a recent or living specimen, are forked; have you made the observation yourself? Previous to your communication, I had marked it *Elodes*, and, according to Latreille's description, supposed that the labial palpi might be forked; but after several observations I am still in doubt, and shall remain so till you answer my letter, for I have not been able to see a fork.

HARRIS TO HENTZ.

MILTON, Feb. 20, 1829.

Since I wrote to you I have found the genus *Cylidrus*, with Latreille's definition of it, in that valuable work. the Nouveau Dictionnaire d'histoire naturelle, which is in the college library. It appears to be closely related to *Tillus*, and probably your 860 belongs to it. Not having seen any of the genera belonging to Kirby's section *Serricornes* of the family *Clerii*, except *Enoplium*, I do not feel fully competent to decide upon your 874, which should be closely compared with the other pentamerous genera of that section to decide whether it is admissible, or whether it should not rather constitute a new genus. The plan pursued. by Mr. Kirby (Linn. Trans. Vol. XII., pp. 340, 389) would facilitate the determination; but the number, division, and pulvilli of the tarsal joints, with the form of the mandibles, eyes and nails, should also be taken into the account. Latreille must be mistaken when he says that in *Thanasimus* there are only four joints visible in the tarsi. In *T. formicarius*, which is the type, there are certainly five distinct joints, as also in *ichneumoneus*, *nigrifrons*, and your 239. [239 Hentz MSS. Catal.=*Thanasimus putans.*] *Thanasimus* then appears to be an osculant genus, connecting the pentamerous *Cleridæ* with the heteromerous genera of that family, through the genus *Clerus*, with which it agrees in its clavate antennæ. Probably your 240 [240 Hentz MSS. Catal.=*Tillus terminalis* Say MSS.] is the link in the chain of affinities uniting *Thanasimus* with the pentamerous *Serricornes*. It is worthy of remark that in *Necrobia* the tarsi are apparently trimerous, the first joint being hid by the base of the second, and the fourth entire, and concealed in the lobes of the third. The antennæ, which are very much clubbed, are most remote from those of *Enoplium* on the one hand, and from your 874 [874 Hentz's MSS. Catal. = *Priocera undulata* Say] on the other, all gradations between these three appearing to exist.

Latreille (Genera Crust. et Ins. III,) remarked the singular armature of the mandible in the male of *Uleiota flavipes.* I have several specimens resembling in form, size and structure. your 754 [754 Hentz's MSS. Catal.= *Uleiota dubia ?* Fabr.], but agreeing entirely with Fabricius's description of the colors of the *dubia*; I therefore think yours must be merely a variety of that species. The confusion made by Duméril in respect to this genus exists only in his plates; for in the text (Consid. gen., p. 192) he refers both to plate 17, fig. 7, and to pl. 7, fig. 3, for an example of his anomalous genus *Cucujus*, which is synonymous with *Uleiota* of Latreille. His *Omaloides* contain *Lyctus*, *Colydium*, *Trogosita*, *Ips*,[1] *Mycetophagus* and *Heterocerus*. I must have made some mistake in writing the name *Cucujus flavipes*. The only insects of that genus that I know are *C. clavipes* Oliv., of a beautiful lake color, and *C. rufus* Oliv., the color of which is brownish rufous and smaller than the former.

The name of your 89 [89 Hentz's MSS. Catal. = *Philonthus flavolimbatus* Harr. MSS.] (*Staphylinus anthrax*) was given me by Prof. Say, as an insect described by Gravenhorst. You will receive the European *Elaphrus riparius* with the insects from me, and can then decide whether it is really the same as your and Prof. Say's American species. Having some years since found a species of *Buprestis* upon the *Carya porcina* which is inhabited by the larva, I affixed to it the name of *obscura?* Fabr., but observed to you in a former letter, that I was not certain whether the name was correctly applied. Indeed it appears to be impossible to determine many of our numerous

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[1] Duméril's *Ips* is a *Cryptophagus* of the modern systems, a pentamerous genus.

Buprestides and *Elaters* without the aid of Herbst's figures and descriptions, which include numbers of them. The name of *Omalisus coccinatus* Say, was given me by that gentleman, but is has not yet been published by him. In the specimen of your 807 sent me and marked 3, 4, 4, I discovered, by the use of a lens surrounded by a concave reflector, that it was tetramerous. Still my specimen may exhibit that conformation, while yours of the other sex may have the hand trimerous. I consider it to belong to the genus *Mycetophagus* (vid. *M. bicolor* and *M. flavipes* Fabr.), of which I have no other examples than the species you have sent me. You mistook the drift of my remark on your 814. It was intended to remind you that in *Elodes* the labial palpi were forked. Having only a single specimen, I was loth to sacrifice it by dissection, and have no other insect allied to it. Your *Rhipisera* (for such I consider it) must be a charming insect, and I hope you will find the male, with its antennæ of thirty-five joints. It differs from the *Ptilinus mystacinus*, as figured by Drury, and is very distinct from *marginata* Kirby. Latreille says (Nouv. Dict. d'Hist. Nat., Vol. XXVIII, article *Ptyocerus*) that "*Melasis picea* of Pal. de Beauvois is congeneric with *M. mystacinus*, the type of Latreille's genus *Rhipicera* and Thunberg's *Ptyocerus*." I have therefore extracted the description of the *M. picea* from Beauvois's splendid work, and annex a sketch of his insect, which cannot be confounded with yours.

Your having incidentally mentioned *Platycerus securidens*, reminds me that if *I* marked your insect of that name, it was probably an error. I never saw the true *P. securidens* Say, till about a year since, when I received one from Mr. Leonard, which agreed in size, etc., with Say's description. The mandibles are very different from those of the other and larger species, which I had hitherto supposed to be *P. securidens*. This larger species appears to be the *Lucanus* (*Platycerus*) *piceus* of Weber. Weber describes another North American species, which is probably the smallest known, being but about half the size of the *P. caraboides*. He calls it *L. quercus*.

You will receive *Peltis ferruginea* from Europe, a genus recently separated from *Thymalus*. This species much resembles the one you caught in Northampton, and I wish you to compare them closely, and if you find them to be distinct, point out in what they differ, and send me the name you give your species, of which I have a short description in my MSS. I have a true *Thymalus* allied to *limbatus* Fabr., from which it differs in being rather larger, in having larger punctures on the thorax, and smaller ones on the elytra, and the series on the latter more remote than in *P. limbatus*. I obtained it from tree fungi. When you see the *Peltis ferruginea* you will be able to tell me whether *Nitidula grossa* can belong to the same genus.

Since writing the description of *Melasis picea*, I have discovered that some confusion exists in regard to the genus *Rhipicera*. Dalman founded his genus *Polytomus* a year or two before Latreille proposed that of *Rhipicera*, and both took for the type *Ptilinus mystacinus* Fabr., *Hispa mystacina* of Drury. Latreille (Nouv. Dict. d'Hist. Nat.) somehow or other appears to have connected his genus with *Ptyocerus* of Thunberg, established upon *Melasis mystacina* Fabr., a very different insect from the *Ptilinus* and *Hispa* of Fabricius and Drury. I do not recollect what Thunberg says about the mandibles of his genus *Ptyocerus*, but the antennæ are 11-jointed, the three basal ones simple, and the remaining ones flabellate within (vid. Nov. Act. Holm., 1806). In the year 1821, Dalman revised his genus *Polytomus*, and added two new species from Brazil, one of which is identical with *Rhipicera marginata* of Kirby. (Compare *Ptyocerus marginatus* Dalm., Nov. Act. Holm., 1821, with Kirby's insect in Linn. Trans.) Your insect does not answer to either of those described in the genera *Ptyocerus*, *Rhipidius*, *Polytomus*, or *Rhipicera*. *Melasis picea* of Beauvois cannot belong to *Polytomus* (which name, in point of time, takes precedence of *Rhipicera*), but possibly may be a *Ptyocerus.* Its bidentate mandibles exclude it from the families *Buprestidæ*, *Elateridæ* and *Cebrionidæ*, though its external appearance would associate it with the *Elaters.*

Not being able to refer Schönherr's *Dendrophagus* to any of the pentamerous families, I have examined closely the *Cucujidæ*, and the following is the result, which proves them to be strictly pentamerous, though in a natural arrangement they are allied to *Trogosita*, a tetramerous genus.

Parandra. First, second and third tarsal joints gradually decreasing in length; fourth (basillary node, Latr.) nearly globular, but separated from the fifth or claw joint by a transverse line, which is fringed with hairs beneath, as are the apices of the preceding joints; claw joints longest.

Cucujus, *Uleiota* and *Dendrophagus.* First tarsal joint minute, shorter than either of the preceding ones, but sufficiently distinct; second, third and fourth, gradually decreasing in length; fifth as long as the second, or longer. I have another *Uleiota*, a third larger than *dubia*, of a uniform blackish color, the sides of the thorax not denticulated, as in that species, but with two minute tubercles, one just before the middle, and the other near the base; feet, antennæ and palpi rufous. It cannot be a *Dendrophagus*, because the last joint of the antennæ is not much longer than the others. Schönherr says that in the male of *Cucujus depressus*, and in *C. planus*, the tarsi are heteromerous. His note on the *Cleridæ* (Introd. Ent. III, p. 683), which I had forgotten before, should not pass unnoticed. All the *Cleridæ* that I have seen are truly pentamerous, though some, upon a superficial examination, may appear to be tetramerous, or (as Kirby says of *Thanasimus formicarius*) heteromerous. The hind tarsi of *T. formicarius* have the first joint cut off obliquely from above downward. The four anterior tarsi do not have the first joint so oblique. In *Clerus* the first joint is very short, oblique, and nearly concealed by the base of the second. In *Enoplium* the tarsi are *apparently* tetramerous in a different way; the first three joints are distinct, the fourth minute, nearly globular or nodose, and concealed in a lobed depression of the upper surface of the third joint; the fifth, or claw joint, is very apparent.

If my specimen, which I name *Opilus ? coccineus*, be truly an *Opilus*, the tarsi are heteromerous, after the conformation of *Clerus*, but the first joint is still less discernible.

I am by no means prepared to reject the admirable eclectic system of Geoffroy and Latreille, and the above observations go to confirm it. The *Cucujidæ* may follow *Passalus* in the pentamerous group, having some external resemblance to the *Lucanidæ*, and all of them agreeing in habit with these and the *Tenebrionidæ*. The larva of *Cucujus clavipes* so closely resembles that of *Dendroides* as hardly to be distinguished from it.

HENTZ TO HARRIS.

Chapel Hill, March, 1829.

I have at last discovered *Morio Georgiæ* Say. This will put an end to our doubt respecting 740, which, notwithstanding the tarsi, is related to *Harpalus*. The *Morio* I have found, though certainly Mr. Say's insect, may be different from *M. monilicornis*, which he quotes, since the latter is said to be an inhabitant of Cayenne, and the description does not fully agree with my insect. The body of *Morio* is somewhat elongated, its habitus being analogous to that of *Clivina*. The eyes are prominent, and suddenly swollen, the head being strangled behind so as to form a neck narrower than the head. The labrum is deeply bifid, and the labium in its concavity has a small, obtuse tooth, which appears nearly bifid. In 740, the labrum (when dissected) appears scarcely emarginate, and the labium has a long acute tooth. This is sufficient to distinguish it from *Morio*. The characters given above agree so well with the description given in the Dictionnaire classique d'histoire naturelle, article *Morion*, that I think it probable that it was taken from my insect. The antennæ are considerably flattened in the middle, so as to appear larger in one direction; and the tarsi of the third pair of legs are much more robust, and thicker than the rest in both sexes,—characters which, with the preceding one, have escaped the notice of Mr. Say, and yet are important; for the last, if common to all the species of this genus, ought to be considered generic, as it is not a common one.

March 8th.

No. 814 [814 Hentz's MSS. Catal. = *Elodes ? fragilis*] I agree with you in thinking nearer *Dascillus* than *Elodes*, as the mandibles are not much concealed under the labrum, but the last joint of the palpi is not what could be called "*tronqué ou très obtus.*"

I have now no less than six distinct species congeneric with No. 807. [807 Hentz's MSS. Catal. = *Mycetophagus punctatus* Say.] When you see them all I think you will be convinced that they are distinct from *Mycetophagus* Fabr. By the by, what genus of Latreille do you mean? Is it *Eustrophus*? If that be the case, I think I have three species to which the name applies better. One of them you marked *Eustrophus bicolor*? To these the characters given in the Dictionnaire classique d'histoire naturelle "*tête très penchée*" applies very well. I have two more species to which all the characters of *Eustrophus* apply except this, "*et dont aucun des articles,*" (speaking of the antennæ) *à partir du 3me n'est lenticulaire*"; they having slightly perfoliate and moniliform antennæ. These five species have the body more or less attenuated behind. But besides these I have two species, one of which, No. 448 [448 Hentz's MSS. Catal.=*Diaperis bicolor* ? Fabr.] you have. I had marked that one *M. bicolor* Fabr., and the other *M. flavipes*. They are both nearer *Diaperis* than any of those mentioned above.

Now here is a great difficulty. The generic characters of Fabricius are insufficient, and he himself did not attend to them very frequently; therefore my 448 may have been referred by him to the genus *Mycetophagus*. Is it not possible that Illiger, or whoever referred *M. bicolor* to *Eustrophus*, took my 751, or some other undescribed species to which Fabricius's description might apply, as well as many more that I have? After all, my names may be well applied. He says the insect is glabrous, which does not apply as well to my 751 as to my 448. As you always follow Latreille's system, you probably had in view *his* genus *Mycetophagus* (Règne Anim. 333). But I do not see how 807 could be placed in the family which contains *Trogosites*. All these insects seem to me to belong naturally to the heteromerous division.

Since writing the above I have been in the woods, and discovered one more species of the same genus. I have now seven distinct ones. The ♀ are apparently tetramerous, the ♂ have four joints in the tarsi of the second and third pair of legs, but the *hand* has but three visible joints. The first is much wider and larger than all the rest together, and furnished with pulvilli, formed by stout bristles. At first sight it has the appearance of the tarsi in *Staphylinus*. I have studied carefully all these insects, which offer precisely the same characters in the ♂ and ♀. Only one is so very small that my best glasses cannot render it indubitable that its conformation is the same; though I am pretty certain that it is. I do not know Latreille's genus, and therefore may be mistaken in my opinion; would you persist in thinking that it belongs to *Mycetophagus* Latr.?

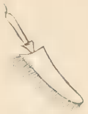


Fig. 10.

As you suppose, the spring has appeared, though very late. For this climate the winter has been unusually severe. I have, however, already collected several new and interesting insects. I have had a little axe made for me, and I go, like a woodcutter, splitting and cutting all the old trees I can find.

I have found three specimens of an insect which puzzles me a good deal. According to Latreille, in the Règne Animal, it would undoubtedly be a *Serropalpus*, as the penultimate joint of the tarsi is bifid in the first and second pair of legs, the maxillary palpi serrated, and the last joint nearly "*en forme de hache allongée.*" But Leach, in the eighth volume of the Edinburgh Encyclopædia, says the body is "almost cylindrical and very long." That does not agree with my insect, which resembles so much a *Cistela* I have, that at first I compared them to ascertain whether they were not of the same species. The insect is blackish or piceous above, and hairy; antennæ, palpi, feet and entire under surface, ferruginous. The elytra have about nine punctured striæ. The head and thorax are punctured, and the thorax has a slightly impressed indentation on each side at the base.

Leach's remark does not seem sufficient to make me call this insect anything but *Serropalpus*, but I will receive your remarks upon it with great pleasure.

I have an insect now marked *Stenostoma* from Massachusetts, first marked *Telephorus* by an unaccountable mistake, for it is unquestionably heteromerous. It may be an *Œdemera*, but the elongation of the mouth made me prefer placing it in *Stenostoma*. The last joint of the maxillary palpi is neither quite cylindrical nor securiform. The insect is pale yellow, the thorax deeper yellow, dark beneath, and the tip of the elytra is blackish. Can you inform me about this insect? It undoubtedly resembles *Telephorus* very much in all respects, except the subcylindrical thorax. The length is not quite $\frac{19}{40}$ inch.

You may recollect having seen a little *Clerus?* which I collected at N. Hampton, with scarlet elytra, now marked 238. [238 Hentz's MSS. Catal. = *Opilus? coccineus* Harr. MSS.] The labial palpi seem to be securiform, but are much smaller than usual in that family. At first it may appear tetramerous, but the first joint can be easily discovered with a strong magnifier. The joints of the hand are wider, as in *Staphylinus*, and a general resemblance with *Clerus apiarius* may be observed. Is it a *Clerus*?

HARRIS TO HENTZ.

MILTON, March 25, 1829.

Among the numerous small insects in my cabinet, set aside at first as undetermined for reëxamination, I have been so fortunate as to discover a true *Elodes*, the *Cyphon ovalis* of Say. The palpi are easily seen without dissecting the mouth. The penultimate tarsal joint is bilobed, and the nails exceedingly minute, and apparently simple. The antennæ are situated below the inner orbits of the eyes, and the clypeus appears to be emarginated on each side for the reception of the first joint of the antenna, which is rather large; the remaining joints are obconic, except the last, which is oval. You will have no doubt that your 814 is not an *Elodes*. Among my small insects are two species allied to your 807, one of which nearly agrees with Say's *Mycetophagus flexuosus*. This insect has the hand trimerous, and I have in vain looked for a penultimate joint. Notwithstanding, it resembles in figure, antennæ, etc., *M. quadripustulatus*, as described and represented by various authors. You may recollect that I mentioned a similar anomaly in the male tarsi of *Malachius*. I then thought that it was owing to my want of acumen that I could discover only four joints in the hand of my specimen, but repeated observations have confirmed this fact, both in *quadrimaculatus* and *vittatus*. I have no male of the *tricolor*, and these three are the only insects of the genus in my possession, unless your 217 be one. [217 Hentz's MSS. Catal. = *Malachius scincetus* Say.] In addition to the above remarks, written before I received your letter, I would observe that I shall suspend my judgment till I have European specimens of *Mycetophagus*, as the genus now stands, for no reliance is to be placed upon Fabricius, and I advise you to examine Duméril's figures of *M. quadripustulatus.* Having previously referred your 448 (*Eustrophus*, as it certainly is,) to *M. bicolor* Fabr., I was abominably stupid and careless in pointing out that species for your 807. *Eustrophus bicolor* ? Fabr. and *E. tomentosus* Say, are both found in Massachusetts. Are the nails of your supposed *Serropalpus* pectinated, as represented in your figure? If so, it is not a true *Serropalpus.* In *quadrimaculatus* Say, the head is nutant, concealed from above by the prominent thorax, and the palpi are not as in your figure. The penultimate tarsal joint of the hind legs is very short; the same in the hand, and the intermediate tarsus is obcordate, hardly bilobed, or not much more than bifid, and the nails are simple. The genus *Mycetophila* is known to me only from LeConte's figure, in the Annals of the Lyceum of Natural History of New York; but perhaps your supposed *Serropalpus* may belong to it, or to *Allecula* Fabr. Your 201 heretofore has puzzled me exceedingly. I found my specimen in Boston street, and recollected Rœmer's figure and description at once; but was astonished, on referring to his work, to perceive that he called it *Lymexylon navale*, an European insect with short antennæ, while his and my insect had long antennæ, and was an American species. At length I concluded Rœmer did not know the genus *Lymexylon* correctly, and therefore labelled my insect *Œdemera Rœmeri*, which name it has borne in my cabinet these three years. I think with you it may be a *Stenostoma.* Your little scarlet *Clerus* ? 238 is probably the insect which I call *Opilus ? coccineus*, and alluded to in my last letter. My specimen was captured upon a board fence.

In answer to your queries respecting some of the *Elaters*, I remark, that finding no description in Fabricius which agreed better with your 128 [128 = *Elater fascicularis* Fabr., Hentz's MSS. Catal.] than that of *fascicularis*, I thought it might be a variety of that species; but am not satisfied that this opinion is correct. To an insect belonging to my subgenus *Nothora*, Prof. Say returned me the name of *dispar* Herbst, and to him I owe all the names from Herbst and Illiger, whose works I have not seen. Prof. Say was probably mistaken in this instance, as you will see from the following description of this and an allied species of my *Nothora.*

"*Nothora* (6, my cabinet). Pale reddish brown, densely covered with depressed pale ochreous hairs. Antennæ with simple elongated obconic joints in both sexes; head and thorax with distinct dilated punctures, the disk of the latter with an impressed line, obsolete before; elytra punctato-striate, punctures distinct; interstitial lines minutely punctured. Length about $\frac{9}{20}$ inch. This species is certainly specifically distinct from the next, and to neither of them can we apply the names *E. lividus* De Geer and *E. elongatus* Beauvois, both of which Schönherr makes synonymous with the *dispar* of Herbst. It is more probable that this *Nothora* is the *Elater cinereus* of Weber."

"*Nothora* (146 of my cabinet). Dark castaneous, antennæ and feet paler, body with short depressed yellowish hairs. Antennæ as in the preceding; head and thorax with dilated punctures, the latter with an abbreviated dorsal line at base, obsolete on the middle; elytra puncto-striate, interstitial lines minutely punctured. Length nearly $\frac{5}{8}$ inch. Can this be the *fulvipes* or *castanipes* Fabr.? Those species are described as having striated elytra, but Fabricius does not inform us whether they are "*punctato-striata.*"

I am not sure that I know your 143; the following description from my MSS. seems most likely to be the same:

"*Elater hieroglyphicus.* Thorax black, elytra pale yellowish brown, striated, with two oblique irregular black fasciæ. Length over $\frac{9}{20}$ inch."

HENTZ TO HARRIS.

Chapel Hill, April 22, 1829.

You will observe that the anomaly in *Malachius* is not of the same nature as in my seven insects. The ♂ in some species has only four joints in the hand, and otherwise is pentamerous, whilst my insects, and probably yours, have a double anomaly; they should naturally be placed in the heteromerous division, though they are tetramerous, and the ♂ has only three joints in the hand. I do not think they ought to be referred to *Mycetophagus*. I mean, when I have matured the subject more, to propose a new genus, having my 808 for its type.

The nails of my 940 are serrated as in the annexed figure: But it does not seem to be a *Serropalpus*, if *S. quadrimaculatus* of Say is one. I have had the insect some two years, but have not named it yet, and at first sight I recognized it from your very excellent sketch. That it is Mr. Say's insect there is no doubt, although the size does not correspond. The palpi, the form of the thorax, the direction of the head, etc., forbid the referring my insect to the same genus with it. Leconte's figure of *Mycetophila* does not agree with my insect, but his plate is very badly executed.

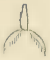


Fig. 11.

My 143 [= *Elater navicellus*, Hentz's mss. Catal.] does not seem to be your *Elater hieroglyphicus*. This is the exact marking of the elytra. They are striated, but the punctures are nearly equal all over. I should say that the antennæ are slightly serrated. The rest of your description agrees.

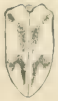


Fig. 12.

In your supposition in regard to the luminous larva, I agree fully, and will look for the ♀ in the season, but I am very unwilling to go into the woods now. They are infested with myriads of ticks which produce an intolerable itching, even when they have not yet fixed themselves on the skin. I am now constantly occupied, while I write, in scratching my abdomen, which has no less than seven protuberances produced by a quarter of an hour's visit of one of those gentlemen as much as a week ago. I have sometimes found thirty or forty in my shirt after a ramble in the woods, and you may judge of my misery then. I could encounter scorpions with more fortitude. We have, moreover, mad dogs and mokeson snakes in abundance to make our solitary forests more agreeable and secure.

The *Molorchus* which you described is probably new, and is not known to me, though very likely it is closely related to *M. bimaculatus* Say, which is very common here at this season on the blossom of the dogwood, along with another species which is wholly black except the thorax; that is ferruginous. Both species vary so much in size (from $\frac{1}{8}$ in. to $\frac{3}{10}$ in.) that I could not say whether the greatest or the least was most common. *M. bimaculatus* is sometimes more than $\frac{5}{16}$ of an inch long. It is strange I have not sent either to you.

One of the sexes of the *Molorchus* mentioned above, with a ferruginous thorax, has antennæ considerably longer than the body, the other has them considerably shorter. Both species are also found on the blossom of the wild plum tree.

Our "rose-bug" is not a rose-bug, for it is never found on that flower as far as I know, whilst it is pretty common on the chinquepin, and other trees, feeding on the leaves, not on the blossom. I think I have found it on grape vines. Its never being found on the rose, which is common here, both in a wild and cultivated state, is the main reason that could induce me to consider it as distinct from the northern species; but the name *polyphaga*, given by Melsheimer or Knoch, indicates what we know, that it may feed on almost anything green. I grant with you, that the aspect differs considerably, but it may arise in a great measure from the difference in size, and as to the coloring, it differs very much in different specimens of our insects. As usual in such cases, I have but one northern rose-bug, and cannot compare it well with ours. I really think ours is a variety produced by the climate, but I may think otherwise to-morrow. The question has puzzled me as much as you. You will observe this fact, however, that several of our insects are much larger than yours. I have a *Rhagium lineatum* which is $\frac{7}{10}$ inch in length. Several species of *Buprestis* are in the same case.

As to *Chremastocheili*, I can assure you that of all the trees on this hill, there is none which I have searched with more care than the chinquapin, and yet I have never found on it, or about it, one of the species of that genus. I have often stood hours around a single bush when the blossoms were out, as myriads of insects crowd there. I have found several *Chremastocheili* flying in the day time and alighting on the hottest side of a barren hill of red clay. But the ants, as at Round Hill, have had the goodness to supply me with living ones, which they carried off without any resistance. The difficulty in finding the habitation of these reminds me that Bosc seems to have made a mistake, if he is the person who supposed that *Boletophagus cornutus* fed on the *Boleti* of this country. I have collected a great number of the ♂ and ♀, and know so well the place which they inhabit, that if you should place me in the dark, before a pine stump which contains any of them, I could at once lay my hands on them. It is only in pine stumps or logs which are considerably decayed, and in which the bark is quite loose, that they may be found. At that part where the rubbish accumulates, which falls between the bark and the crumbling wood, where there is a crust, as it were, of decayed vegetable substance, there are they always found, and in no other place whatever. They have good wings under their shells, but, though I may be mistaken, I believe their elytra are not intended to separate, for they open with some difficulty.

Have you *Dicælus purpuratus* Say? It seems to me certain now that the insect you sent me at Northampton is not *Dicælus elongatus*. I will copy for you the notes on this subject from my journal.

"No. 64. This is most probably *D. elongatus*, although it is longer. The specimen now marked 907 was sent me by Dr. Harris under that name, but it differs from this materially, and, except for its length, which agrees with Say's description, it can hardly be referred to that species. The thorax in 907 is shorter and wider at base. The whole insect is shorter; and the name *elongatus* seems at first sight to be misapplied. Besides that, the elytra offer differences. In 907, between the suture and the humeral elevated line, there are five interstitial lines, three of which are not uncommonly convex, but the two intermediate ones are remarkably convex, and, visible to the naked eye, continue so till they reach the humeral elevated line near the apex. Moreover, the three striæ between the humeral line and the margin are very distinctly punctured, and the others near the apex are obscurely so, whereas in No. 64 the punctures are obsolete, and even wanting on the marginal striæ, as well as at the apex."

["No. 64. This has two impressed dots, each with one hair, on the margin of the thorax. It is probable that this is the same as *D. simplex* of Dejean, and that he described the variety labelled (64 ? ?) in my collection, or else that is *D. simplex*, and I do not possess *D. elongatus*." Hentz's MSS. Catal.]

HARRIS TO HENTZ.

MILTON, June 5, 1829.

Your *Macrodactylus* I have compared with numerous specimens of our rose-bug; the colors and size of which (namely, our insect) are very uniform in different individuals. Setting these circumstances aside, your insect appears *primâ facie* to differ sufficiently to constitute a distinct species; being proportionately more elongated and slender than ours, and having the four posterior tarsi distinctly annulated with white bristles.

Our rose-bug prefers the petals of the rose, but is also found abundantly on the blossoms of *Chrysanthemum leucanthemum*, on the leaves of the wild and cultivated grape vine, and on the tender leaves of many fruit and forest trees; it may, therefore, be truly called polyphagous. To me it appears that you will be perfectly safe in making distinct species of these insects, and unless you do so, Dejean will probably anticipate you.

I have found a few specimens of *Chremastocheilus Hentzii*, and one of *C. Sayi*, in this vicinity, in the middle of a hot day, in a dry road exposed to the sun. Their flight is short, irregular, and something like that of a dipterous insect. There are but few chestnut trees here, and I have searched them in vain for these insects.

Mr. Oakes found a large number of *Eledona cornuta* in tree *Boleti*, at the base of the White Mountains.

HENTZ TO HARRIS.

CHAPEL HILL, July 8, 1829.

Your 765 seems to be the same as my 78 though much smaller. Here is the extract of my journal on that subject. "78. This is probably *Dytiscus verticalis*; but Say's description is not correct. After *a geminate impressed punctured spot near the nasus*, he probably intended to have written *on each side*. He has overlooked the acute line above the vertex and the impressed spot on the anterior termination of the dorsal line of the thorax (wanting in yours). The three series of punctures are not very distinct, excepting the one nearest to the suture. I do not know where *D. marginatus* is described which he mentions at the end of the description."

We have the *bête rouge* here too, from which I suffer enormously now; but I alluded to a true tick, which has a silvery spot on the back, and is seen only in the early part of the season. There is another species a little smaller, without the silver spot, which is suggested by the country people here, to be the young of the preceding one a year old. Then we have the seed-tick, which will appear about the middle of this month. They swarm in the woods, and are seen always gathered in a lump of four or five hundred holding together tight at the end of a blade of grass. As soon as you touch them with the foot or leg they instantly scatter on your body. Then! then! you have fine work in scratching. I could not think of a worse punishment to my greatest enemy than to have one of these little flocks to scratch off every morning. The country people here have a firm belief that these are the progeny of the big ticks which fall off in the autumn from the sides of the cattle; *and that the blood which they contain is during the winter converted into these sociable little mites!!*

Some time in March or April, I discovered in a standing trunk of a decaying tree, about thirty larvæ of an insect which were feeding on the black mould resulting from the decomposition of the wood. They so completely resembled the larva of *Scarabœus Tityrus* that I took them for such, and brought them home in my handkerchief to feed them in a pot with the substance in which they were found. They were so large that I did not doubt they would transform this season, and I intended to save some in spirits in all the states so as to try to make out the anatomy and history of the insect. I did so, and kept about twenty-five in the black mould. About five weeks ago, they began to make their nests for transformation. These are about the size of turkeys' eggs and are nothing but the mere mould glued with a viscous substance, and having a central cavity of the size of a small hen's egg, in which the insect changed to a pupa state. About a week ago, I opened them and found that they were all transformed; but they were not the *S. Tityrus* as I thought, but *Phileurus Didymus*, which, by its habits, had puzzled me so much formerly. By the by, you would oblige me by giving me the characters of *Phileurus* from Latreille's "Genera." Having so many specimens of this large insect, would it not be well to make out, if I can, its anatomy and history? The habit which I alluded to above, is to come down into houses by the chimney. At least, that is the only way in which I can account for its presence. Mr. Andrews, two years ago, was astonished to hear a noise in a stove, which, since winter, had stood unopened in his room. He found one of these insects in the ashes, and was tempted to think that, like our ticks, it had an unnatural origin. We found several in our rooms at midnight when no door nor window was opened. In a word, I think that the insect always deposits its eggs in standing hollow trees, for which it mistakes chimneys. I see the reason why the tree should be standing. The cavity produced above the mould is an excellent receptacle for water and to keep up a moisture which is indispensable to soften the food of the larva. In the perfect insect, I see no external difference between the ♂ and ♀.

HARRIS TO HENTZ.

MILTON, July 28, 1829

Your speaking of the habitat of *Phileurus* leads me to make some remarks on those of other lamellicorn genera. The larvæ of *Lucanus dama* Fabr. and *Gymnodus* (*Trichius*) *scaber* Beauv., are found in the hollows of decayed trees. The cocoons of both are of similar form and composition with those of *Phileurus* and *Gymnoproctus* (mî) (*Trichius*) *canaliculatus* Fabr. I once found great numbers of them in a decayed stump, in their perfect state, but saw no larvæ. You and Prof. Say found *Scar. Tityrus* in decayed trees. Some writers say that the larvæ of *Cetonia*, in Europe, inhabit ant-hills. The large hills in our woods appear to be composed of vegetable or ligneous matter, very analogous to the *débris* or tan of decayed trees. On the contrary, *Scar. relictus* Say, inhabits heaps of dung accumulated in our cow-yards, etc., whence I have obtained and bred the larvæ. I suspect, also, that my small species allied to it, as also others in my cabinet, viz., *S. tridentatus* Say, *S. gibbosus* De Geer, and a still smaller species, will be discovered in stercoraceous situations. My specimens were found in roads frequently traversed by dung-carts. This difference of habit will lead to a subdivision of *Scarabæus*, if close examination should show any difference in structure, which we might naturally expect.

Respecting No. 96, *Callistus ? pallipes* Fabr., I would make some remarks in answer to your queries. I believe it to be the *Carabus pallipes* of Olivier and Fabricius, and in this, Prof. Say, to whom I sent the insect with this name, coincided. Fabricius described a German insect, also by the name *pallipes*, but afterwards changed the name (see his Index and Schönherr, I, p. 190, No. 116) to *albipes*. Without thinking of the old name for the German insect, and without considering the brief characters given for *Callistus*, when I saw the *pallipes* Fabr., enumerated among the *Callisti* in the "Règne Animal," I concluded, of course, that it was intended for our American insect. On rëexamining the "Règne Animal," I find that Panzer 73, 7 is quoted as synonymous with the *pallipes* which proves that Latreille meant the German insect. You have sent me four Carolinian insects congeneric with my 96 [= *Feronia pallipes* Fabr., Harr. MSS. Catal.]. First (587, my cabinet) [= *Feronia pallipes* Say, var., Harr. MSS. Catal.], though considerably larger, is probably an overgrown specimen of our very abundant *pallipes*; second (586, my cab.) [= *Feronia lincola* Fabr., Harr. MSS. Catal.], I suppose to be *lincola*; it has two conspicuous black spots on the thorax; third (906, my cab.), your 49, which I call *limbata* Say; and fourth (my 906 bis), rather smaller than *limbata*, but most likely a variety only.

An excellent natural character by which you may distinguish *Colymbetes* from *Dytiscus* (if you have not the males) is that there is a projection of the anterior part of the orbit over the eye in *Colymbetes* and not in *Dytiscus.* This character has not been noticed by entomologists. You will see it very distinctly in the beautiful and rare *C. sculptilis.*

Have you a *Scymnus*? I have raised a single specimen of three species. The genus was separated from *Coccinella* by Herbst. The "thorax is scarcely narrower than the coleoptra, the lateral and external margins meeting together; body ovate, pubescent," three last joints of the antennæ (nearly connate) united closely in an ovate club. The species are small, and the larvæ, I believe, have not been described. Like those of the *Coccinella* they feed upon *Aphides.* They have on each segment six *flocculi*, in a transverse series, white as snow, and of a cottony appearance. They wander among the aphides, seize them with their mandibles, then elevate them, and suck their juices out, leaving only the skins. They become pupæ on the leaf of a plant, as do the *Coccinellæ. Scymnus*, as you know, means lion's whelp. My first discovered species I named *S. ferox*, a character which it seems is not peculiar to one species of these "wolves," or lions, "in sheep's clothing."

The larva of *Hispa* is an anomaly in its habits. It feeds upon the parenchyma of leaves between the cuticles, and its situation is detected by a yellow or reddish spot. You will not confound it with the subcutaneous *Tineæ* whose habits are similar. The larva of *Hispa* is a hexapod, that of the *Tineæ* apod. The larva of *Clythra dominicana* lives in a case; I obtained some of the pupæ-cases under a stone; they are very curious. Perhaps you may find those of your large Southern species. The larva of *Imatidium argus* Herbst, is much like that of *Cassida*, but the spines are branched. How this genus and *Hispa* can have any affinity I cannot conceive, so adverse are the larvæ and their habits.

HENTZ TO HARRIS.

CHAPEL HILL, Aug. 13, 1829.

I am willing to confess to you my want of acumen in finding so little difference between your 582 (my 13), marked by you *Brachinus fumans*, and the European *B. crepitans*, that I can only look upon them as varieties. Perhaps I am quite wrong, but I fear it is too much the fashion with our brethren naturalists of Europe, and even Mr. Say, to make new species with slight varieties. It is true that *B. crepitans* is smaller, but my 13 varies from $\frac{2}{5}$ to more than $\frac{1}{2}$ an inch. We ought to investigate thoroughly, but we must beware against the danger of creating confusion by making too nice distinctions. Insects of the same species vary considerably in color, in size and in shape, even in the same country. I have taken in the act of copulation insects which accidentally (not sexually) varied enough in shape to create a distinct species, if they had been taken separately.

I thank you for mentioning your discovery for distinguishing between *Colymbetes* and *Dytiscus*. It is of the highest value, where we must, in the state of the science, have the two sexes to ascertain genera. I wish you would try to find some character of that kind for the *Thoracici*. I think I have a *Scymnus*. I always thought it related to *Coccinella*, but have not yet studied it, nor is it labelled. It is common on corn stalks, where it runs like *Coccinella*; there is a brown spot at the end of the elytra.

I have now *Megacephala virginica* and *carolina*. The latter was sent to me by a friend from Newbern, never being found here. The other (*M. virginica*) is also a beautiful insect. The mandibles of the ♀, in all specimens I have seen (six or eight), are shorter and more curved than in the ♂, and on the right side they have three teeth of great strength, the middle one longest; on the left side the middle tooth is shortest. This insect is always found under stones, and never flies off when discovered, like *Cicindela*. The external resemblance to that genus is remarkable, and yet they differ wholly in habits. I have also received a *Pasimachus* from Newbern, marked 1001 in my catalogue. It is very doubtful whether it be Mr. Say's *P. subsulcatus*. This is fully as large as *P. depressus*, which is described as being very much larger. The lines on the elytra cannot be said to be obsolete; they are nearly sulcated.

Have you the ♂ and ♀ of *Trichius canaliculatus* taken in the act of copulation? It is not rare here, and does not differ much from the specimens you have sent me, except that it varies much in size. But what puzzles me about that species is, that young Andrews and I have each found a specimen apparently of that species, having a tail or ovipositor like that of the ♀ of *T. hemipterus* of Europe, to which, by the by, it is closely related. Is it possible that these are the only females among so many males that I have caught? or is it a distinct species? But I cannot see any other difference between the one I have and all the others. Did I ever send you my 373? It is the only insect in my collection to which I can affix the name of *Blaps*. Have you any insect of that genus? I cannot find that mine is described anywhere.

I have, this season, collected a great number of *Melolontha polyphaga* Melsh. (I think this name is the best.)

I am just beginning to study *Hymenoptera* in earnest. Do tell me how you find out the sexes, when there are no external differences, as in wasps and bees. Jurine mentions one being able, in that case, to find them in sexual connection; but it is an actual fact that I do not recollect seeing a hymenopterous insect in that situation once in my life.

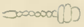
HENTZ TO HARRIS.

Chapel Hill, August 24, 1829.

I begin, as usual, with questions. Do you consider your "*Cistela sulphurea* European, but naturalized here," as distinct from Say's *C. sericea*? or do you think he described an insect already known? I want also to know whether all your specimens have an impressed spot on each side of the thorax as the one you sent me. My specimens have none; and if all yours are so, we may establish two species. I have sent you mine, and you returned also that name for it. My number for them is 398. Your 777 [="*Scirtes tibialis*, Harr. mss.," Harr. mss. Catal.] has neither antennæ nor palpi, but I am almost convinced that it cannot be an *Orchesia*. I have two species undoubtedly belonging to that genus, one of which may be the European species. The body of *Orchesia* is "long and narrow," the elytra are "*étroites, terminées en pointe*." The posterior tarsi are "more than twice as long as the tibiæ, the first joint as long as the rest together." It is undoubtedly related to the *Mordellones*, and leaps like the insects of that family. It lives in *Boleti*, where I have found the larva, pupa, and perfect insect. In the twelfth volume of the Dictionnaire classique d'histoire naturelle, there is a full account of this genus. I will send you one of my smaller species; both seem to be quite rare. They transform in midwinter.

I cannot look upon my 648 as Say's *Doryphora decemlineata*, though it is evidently related. The suture is not black, the interior line is never confluent with the suture, etc.; moreover, though he calls it *decemlineata*, according to his description it should have twelve lines, counting in the suture. Mine never has but eight, though the centre of the widest band has sometimes a little yellow, which approaches to a division into ten. What do you think? Is that a correct description if mine is his insect?

As you study larvæ, you will perhaps explain to me the strange attack of some *pupìvorous* insect upon a worm which is now under my eye. About ten days ago, some stalks of the tomato were brought to me with two larvæ of a *Sphinx*, new to me, feeding on the leaves; one of them covered with little black spots indicating the wounds made by some *Ichneumon.* But what I cannot comprehend is that from each spot there issues a thread, from which hangs a little cocoon of beautiful silk, like that of many insects of that great family; there are perhaps forty on this larva, which has ceased to eat, but continues alive, though shrinking every day in a state of immobility. The other, after feeding two or three days, died, apparently owing to the cold weather which we have had. Is it not possible that this larva has been attacked by two different enemies of the same family? My 119 (Hym.) makes little yellow cocoons, which are aggregated in one bundle, but this makes them white and singly, and what use there is in their dangling about like bells on the back of the larva, I do not know.

I send you a rough sketch of an insect which I found in March under the bark of a dead hickory, and also of a pine. It is tetramerous, and has no joint bifid, but the first two joints of the manus are somewhat dilated. The palpi are filiform. This may be the ♂. I have another insect which may be the ♀, and the antennæ of which are thus:  The insect is bright rufous, polished, with the disk of the thorax and two bands on the elytra black. It is related to *Languria*, but, according to Latreille, does not belong to that family. What do you think it is?

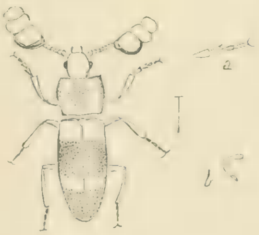


Fig. 13.

Among your *Tenebrionites* there are three which I do not possess; your *Upis rugosus* and *anthracinus*, and your *Tenebrio punctulatus*. *Upis lævigatus* is the one about which I inquired in my preceding letter. I have one species considerably larger, and closely related to it, which is distinguished from it chiefly by the form of its thorax, which is more convex and is narrower at base. It is from Newbern. I have in all, five species which you have not, if one of them (No. 1004) is not *T. badius* Say, with the description of which it does not well agree. Besides these I have a *Toxicum?* [*Boros unicolor* Say]. I should have no doubt about its belonging to that genus, were it not that the antennæ have a club of only three joints. The other characters, except its elongated form, are those of *Tenebrio*, or rather those of *Upis*, as the thorax is narrower than the elytra.

This fall I captured *Lamia bifidator* Fabr. It is a beautiful insect. I am inclined to think that his *L. nodosa* is the same insect, although it is the fourth joint of the antennæ which is incrassate. I collected five or six (to me) new species of *Clivina*, the largest of which, and the most beautiful, seems to be new, certainly not described by Say. Among the *Adephagi* there is an accession in my cabinet of perhaps fifty species, a few among the intermediate families, scarcely one of the *Lamellicornes*, but many heteromerous insects, and a good number of *Rhynchophora* and *Longicornes*.

HARRIS TO HENTZ.

Milton, September 5, 1829.

The Carolinian species (of *Chremastocheilus*) allied to *Hentzii*, upon careful examination and comparison with that insect, appeared to present characters sufficiently distinct. There is a small white spot on one elytron, which is situated as in *Hentzii*. The other is effaced. I have mislaid my notes on this species; but what struck me as the most distinctive character was this:

the anterior tubercles of the thorax do not seem to be a dentiform continuation of the angles, as in *C. Hentzii*, but appear rather like tubercles implanted within emarginations. So also the posterior tubercles are placed rather below the plane of the disk of the thorax in the Carolinian insect, and are separated from it by a conspicuous furrow, which is not so apparent in *C. Hentzii*, in which the tubercles are more nearly in the same plane as the disk. I would call the Carolinian insect *C. Knochii*, in honor of the founder of the genus, and because it approaches considerably to the *C. castaneæ* of that author.

From what you say respecting *Lebia platicollis* Say, and the *variety*, I can have no doubt respecting the insects to which you refer, and believe them to be those described by Prof. Say. I am not equally certain that he was correct in considering the variety as referable to his *platicollis*; it appears to me, on a careful examination, to be entitled to consideration as a distinct species. Both belong to the genus *Cymindis*, as defined by Dejean, and the *platicollis* which I last sent you is certainly *C. complanata* Dejean. Since seeing his description I have labelled the variety in my cabinet with this name, *C. comma*. It differs, as you say, in being uniformly larger, the thorax proportionally smaller, the margin more dilated, and in having a wider ochreous elytral margin, with a humeral lunule of the same color. I have never found it associated with *platicollis*. It is true that Dejean has been accused of multiplying species too much, but this is rather a convenience to the student. However, his work will prove to you that we have several species of *Brachinus* distinct from the *crepitans* and *fumans*. Nothing universally decisive is to be inferred respecting identity of species from seeing them *sub copula*. Different species of *Coccinella* are known to mix in this way; and I once captured a male *Elater appressifrons* united to a female *E. brevicornis*, and have the sexes of each of these species. I once captured numerous specimens of a small *Trichius* (supposed to be the *canaliculatus* of Fabr.) in a decayed apple-tree stump.

The two sexes differed in color, and I saw them united repeatedly. Not one female had a tail, and this circumstance puzzled me. I read Knoch's description of the *canaliculatus*, the female of which he says is furnished "*aculeo ani elongato.*" The presumption with me is that there are two species; the tailed one of the South being the true *canaliculatus* of Fabricius and Knoch, and the other the *canaliculatus* of Olivier, or *squamiger* of Beauvois.

You have not sent me any species of *Blaps*, but I have *B. tricostata* Say, from Arkansas, and supposed that all the American insects of the family were confined to the dry plains of the West. You ask me what is the name of our common large *Tenebrio*? Not knowing exactly to what species you refer, I subjoin the names of all my species, premising that I make, with Herbst, a subgenus of those species which have the thorax narrower at base than the coleoptra, and having the antennæ conspicuously thicker towards the tip.

Subgenus *Upis* Herbst.

No. 427, *Tenebrio* (*Upis*) *rugosus*, mî. Black, rugose, opaque; each elytron with nine series of deep linear impressions; thorax broadest before the middle, excurved before the posterior angles which are produced; two last ventral segments sublævigated. Length .80 in.; breadth .35 in.

This insect appears to be rare. It was brought to me by my cousin, who captured it in New Hampshire. It resembles somewhat *excavatus* Herbst, from India.

No. 313, *lævis* Oliv., *pennsylvanicus* Knoch and De Geer; *chrysops?* Herbst. Black, lævigated; each elytron with nine series of small punctures, which are nearly obsolete at tip; thorax broadest behind the middle, posterior angles acute, slightly excurved. Length from .75 in. to .84 in.; breadth from .27 in. to .32 in.

No. 312, *reticulatus* Say.

No. 798, *rufipes* Say.

No. 428, *anthracinus* Knoch. Black, polished; thorax subquadrate, broadest at base, posterior angles rectangular, elytra with impressed, punctured striæ, and convex, interstitial lines. Anterior tibiæ of the male with a spine within the middle. Length from .50 in. to .62 in.; breadth from .18 in. to .24 in.

U. rufipes is hardly distinct from this species, and differs only in having the thighs rufous or pale piceous.

No. 143, *fulvipes* Herbst. *Trogosita femorata* Fabr.

Subgenus *Tenebrio* proper.

No. 128, *molitor* var. *americanus* Peck. Black, opaque, confluently punctured; posterior angles of the thorax subacute, produced; elytra striate, striæ punctured, interstitial lines acute. Body beneath, tarsi and antennæ piceous, the latter fulvous at tip. Anterior tibiæ of the male arcuated. Length from .52 in. to .71 in.; breadth from .17 in. to .25 in.

For this species Prof. Say erroneously gave me the name of *barbatulus* Knoch, which is a *Upis*, allied to *lævis*, and has a bearded labium. Our *molitor* is found exclusively about houses, barns, and granaries; the larva feeds upon corn, flour, etc., and not upon wood.

No. 316, *punctulatus* mî. Blackish brown, oblong, punctured, subrugose, elytra punctato-striate, interstitial lines convex, subacute; all the tibiæ arcuated; tips of the antennæ ferruginous. Length .52 in. to .66 in.; breadth from .19 in. to .24 in.

It is a much larger species than *badius*, with but little polish, the punctures more distinct, no larger ones on the sides of the thoracic base, and the interstitial lines acute. In *badius* the interstitial lines are convex and rounded, and the tibiæ are not arcuated. *T. punctulatus* is distinguished from our *molitor* at once by its aspect, and by having all the tibiæ arcuated, the body somewhat polished, and the posterior thoracic angles straight and not produced. The larvæ of this and all the other species which I have seen, except *molitor*, live in rotten trees.

No. 292, *badius* Say.

No. 429, *reflexus* Say.

No. 903, *interstitialis* Say.

No. 715, *Tenebrio?* [= "*Uloma fodiens* Germ., teste Hentz," Harr. MSS. Catal.] blackish-brown, polished, head with a transverse, broad impression, antennæ hairy; thorax distinctly punctured; elytra punctato-striate, interstitial lines convex, sublævigated; anterior and intermediate tibiæ denticulated on the external edges. Male with a broad, transverse depression on the thorax near its tip. Length from .40 in. to .45 in.; breadth from .16 in. to .19 in. This insect resembles *badius*, but the foveolate head and thorax and denticulated tibiæ sufficiently distinguish it. Probably it does not really belong to the genus *Tenebrio*.

In answer to your queries for a diagnostic between the sexes of the *Apidæ* and *Vespidæ*, I can tell you but little more than you will find in Kirby and Spence, III, pp. 301–347. In the male the antennæ are generally longer and have more joints than in the female. The eyes of the male are often very large, and nearly meet on the top of the head, which, however, is smaller than that of the female; *Apis* and *Xylocopa* are examples. The male *Polistes fuscata* may always be known from the female and neuter by its white face. In some genera, as *Trachusa* Jurine, *Megachile*, *Cœlioxys*, the anus of the male is bifid, and of the female acuminate. In other genera this part is obtuse in the male and acuminate in the female.

HARRIS TO HENTZ.

MILTON, Oct. 24, 1829.

My *Cistela sulphurea?* Fabr., I believe to be identical with *C. sericea* Say, Journ. Acad., but not the same as *C. sericea* Say, Long's Exped. These two species of Professor Say I have always considered as distinct. It is true, as you have observed, that in the insect sent you for "*C. sericea* Say, Long's Exped.," there are two depressions on the thorax, more obvious in some specimens than in others, transverse, arcuated, and almost dividing the thorax in an undulating line into two parts. Besides this character, the insect is larger and darker than the other *sericea* or *sulphurea.* As it was first described, it must retain the name given it by Say, even if the other should prove to be distinct from the *sulphurea* of Fabricius.

Your remarks on my 777 led me to make a critical examination of it. Much to my surprise I found that the maxillary palpi were pointed, the labials fuscated, and the tarsi pentamerous; add to these characters the incrassated posterior femora and spined tibiæ, and we must conclude the insect to be a *Scirtes.* It is probably allied to *depressus* Fabr.

Compare the insect you have figured with my sketch of *Ropaloceros fasciatus*, in a letter written Dec., 1828. You will then be convinced that yours is at least congeneric. My insect differs from your figure in being about one-fourth smaller, in having the anterior angles of the thorax and of the elytra more rounded, in having the first two joints of the tarsi subequal, the third smallest, and the claw joint longest of all. I place my insect among the *Xylophages* of Latreille, and near to *Paussus.*

If no mistake has been made in the European insects sent me, *our Tenebrio molitor* most closely resembles *T. obscurus* Fabr., and my *T. punctulatus*, *T. molitor* Fabr. But the habits of these allied insects are completely reversed, our *molitor* never living in wood, and my *punctulatus* never being found in meal. I think you must have my *punctulatus*, as it is the most common species.

The insects injurious to the vine in this State have received some attention from me; they are *Macrodactylus subspinosus* Fabr., its most destructive enemy, next to which in noxiousness is an homopterous insect, which I call *Tettigonia vitis*, pale yellow, with a rosaceous fascia on the base of the hemelytra, another on the middle, and a fuscous one at tip, just before which is a rosaceous angulated tranverse line. Length one tenth of an inch or one line. Thousands of these live on a single leaf, and by their punctures exhaust the sap, and cause the leaf to turn yellow or brown. The other insects attacking the vine in Massachusetts, are *Anomala varians* Fabr., *Pelidnota punctata* Fabr., and several sphinges and moths.

This day (Oct. 25) I have found a small *Thanasimus* new to me.

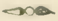
Thanasimus? analis, mî. Four anterior tarsi 5-jointed, posterior tarsi (apparently) 4-jointed, the first joint being concealed above by the base of the second joint. Antennæ clubbed, club 3-jointed, terminal joint ovate, obliquely subacuminate. Tarsal joints (except the claw joints and first of the hind tarsus) sub-obcordate, hollowed above, and membranaceous in the middle of the tip; claw joints and first and second of the hind tarsus obconic; nails with a short robust tooth beneath the middle. Labrum transverse, emarginated, labium bilobed, the lobes rounded; maxillary palpi 3-jointed, joints cylindrical, terminal one longest; labial palpi 3-jointed, first joint short, minute, second long, obconic, terminal joint dilated, securiform. Mandibles dentated at apex. Eyes notched. Thorax obcordate or contracted behind. Description; black, hairy, punctured; mouth reddish beneath; each elytron with two arcuated white fasciæ, convex forwards, one on the middle and one near the tip; neuter pale sanguineous. Length .20 in.

Oct. 26. Yesterday I gave the above characters, and to-day I discovered *Thanasimus formicarius* Fabr., which exhibits all of them except that the basal joint of the hind tarsi is much more apparent.

HENTZ TO HARRIS.

UNIVERSITY OF N. C., NOV. 18, 1829.

You must excuse me for having forgotten your sketch of *Ropaloceros fasciatus*. At the time I received your letter I did not know the insect, and I have a bad memory for descriptions only; though your *Boletobius montanus*, sketched in the same letter, I recognized at first sight, when I received the insect from you. My 776 is not only congeneric, but may belong to the same species with your insect. I have only two ♂ and one ♀, or what I suppose to be such. I will send you one ♂, and if it be of the same species with yours, I shall be glad to know it.

I have not your *Thanasimus*; but I shall be glad to receive from you all the information you can give me on that family. I am as much puzzled as ever to fix on some certain characters to divide it. I have now a little insect, collected last summer, which in all respects answers to the characters of *Thanasimus*, except in the palpi, which are not securiform, but all filiform. It may belong to *Pelecophorus* Dejean, but I am not acquainted with that genus. Its length is only .15, its breadth about .05. Its color is piceous; the mouth is ferruginous, the antennæ are pale, except the last three joints. The elytra have large and deep punctures arranged in regular striæ; interstitial spaces very narrow, and often interrupted. There is a lunule on the disk near the base, a common band on the middle, which advances to a point on the suture towards the base, and a little dot near the apex, of a pale yellow. The thighs are pale. The insect being small, and a unique, I have not dissected it. The palpi are thus:  Last joint blackish. And though the tarsi appear to be disposed as in *Thanasimus*, I can see only four joints; but I have not placed it under a microscope for fear of injuring it.

I found this fall in a *Boletus*, two specimens of a *Thymalus*, which when compared with *T. limbatus* Fabr., of Europe, sent me by you, offer no differences which I can perceive.

I believe our *Cicindela denticulata* is the same with *C. rugifrons* Dejean, I, 53. It is true the labrum in all the ♀ observed is blackish, but that is very often the case with the ♀ of *C. unipunctata*, *splendida*, *hirticollis* (*repanda* Dejean) and my 1125 (probably *C. rufiventris* Dejean, which I suppose to be a variety of *C. hæmorrhoidalis*). Now he may have a specimen where the labrum has not changed its color.

Your 582 which you labelled *Brachinus cordicollis*, I numbered 1126 [= "*Brachinus cyanipennis??* Say," Hentz's MSS. Catal.]. I cannot agree with you as to the specific name. The third and fourth joints of antennæ have no black spot as in *B. crepitans*. The fourth at tip, and all the terminal joints are a little darker than the three basal ones. The elytra are not of a color "*plus bleue et plus claire*," but, on the contrary, are darker. The postpectus and abdomen, instead of being "*presque noirâtre*," are almost testaceous. If there is no mistake in labelling, I think you will find it does not agree with Dejean's description. In that case, you ought to describe it as new. Is it from Massachusetts or New Hampshire?

HARRIS TO HENTZ.

MILTON, Jan. 3, 1830.

Your 220 has a close resemblance in the form of the head, antennæ and thorax to *Telephorus*. It is remarked by Latreille (Gen. Crust. et Insect.) that the mandibles of *Malthinus* have a strong tooth within the points—"*mandibula intus dente uno valido*"; this would justify me in placing this insect in the genus *Malthinus*; but I submit to your better judgment. May not *Cantharis abbreviata* and *brevipennis* belong to the same genus as this insect?

Your 725 [= "*Stenocorus quadrigeminatus* Say," Hentz's MSS. Catal.] may very likely be the *quadrimaculatus* of Linné and others, which species was found in Jamaica by Sloan. It is, however, not a little remarkable, if your insect is identical with the Linnæan one, that the same species should be found both in the warm regions and forests of South America, and in the boreal forests of Maine, from whence a specimen belonging to a friend of mine was lately brought.

HENTZ TO HARRIS.

UNIVERSITY OF N. C., Jan. 23, 1830.

My conclusion about my 740 [= "*Cratacanthus pennsylvanicus* Dejean," Hentz's MSS. Catal.] is that it cannot be ranked as a *Morio*, of course; that it is not an *Ozæna* because the antennæ are not sensibly larger at their extremity, and the body is not flattened; but that it must be related to both these genera. Do you not think it must form a new genus, and that it is the connecting link between the *Scaritides* and *Harpalus*, or between the *Bipartiti* and the *Thoracici*?

I had, as you supposed, overlooked the beard depending from the under lip of the *Upis*, because I could not see (and I confess I cannot now see) any difference between those having a beard and those having none. On receiving your letter, I emptied the vial containing my duplicates, and was glad to find as many as nine. I examined them all with great care, and found six ♂ and three ♀, but that which I had strongly suspected before was realized. All the ♂ were bearded, and the three ♀ were destitute of that character. It would seem by your letter that bearded ones are not found in Massachusetts; that point ought to be ascertained; it is certain that, according to my observation here, *Upis lævis* and *barbatulus* must be the two sexes of the same species, if my specimens can be referred to those species (of which I am not certain, not having yet Olivier or Knoch to consult), but your insect may be a different one.

"220. This singular insect is undoubtedly allied to *Malachius*, and belongs to Latreille's family *Melyrides*. From the first and second segment of the abdomen there issue caruncles like those of 209. I believe the wings are never folded under the elytra. I will make this the type of a new genus." This is extracted from my journal; but since you informed me of the fact that Latreille has observed a tooth in the mandibles of *Malthinus*, I am inclined to think with you that 220 *may* be referred to that genus. Having only the Règne Animal to acquaint myself with it, I was authorized to suppose my insect could not be referred to it, since he placed *Malthinus* in his *Lampyrides*, which are distinguished from the *Melyrides* by their simple mandibles. But even with the short account of *Malthinus* in that work, I find room to doubt. He says: "*Dont les palpes sont terminées par une article ovoide.*" The maxillary palpi in 220 have their last joint decidedly securiform, though not strongly so; and the labial ones have their last joint subsecuriform. The outline of *Malthinus* in Kirby and Spence's first volume, if correct, would prove that my insect differs much from that genus. The antennæ, in that plate, are nearly as long as the body, the thorax differs wholly, and the elytra are made to appear longer than the uncovered portion of the abdomen, whereas in my 220 they are constantly shorter, in some only half the length. I shall be glad to know what you think ultimately on the subject, as I mean to abide by your opinion.

725 is named *S. quadrigeminatus* Say, in my catalogue, and the following remark is in my journal: "As Mr. Say did not compare insects with this, but most probably only plates or descriptions of *S. quadrimaculatus*, *maculosus*, etc., it is very probable that this insect is *S. quadrimaculatus* Fabr."

The *Cicindela* marked 11 by me, and which you call *C. ab-*

dominalis, as I once did, is now labelled 1125, and I believe when you examine it with the description you will refer it to *C. rufiventris* Dejean. No. 11 is devoted to my *C. hæmorrhoidalis*, which you generously gave me, and even named for me. When I first found 1125 here, I supposed it to be a variety of 11, and I have specimens which resemble it so well that no difference can be observed, except that the bands are slightly interrupted. It varies infinitely in markings, more so than any species of that genus whatever. But in all its variations we can observe the closest affinity with the other. That variableness is perhaps the best character which may distinguish it from 11. *C. abdominalis* is unknown to me. *Elater myops* is common here, varies much in size, and lives in pine stumps.

604. *Orsodacna vittata ?* Say. Immediately after, you name your 679, *O. hepatica* Say. If that be a very much smaller insect resembling it, I think you will convince yourself that there is but one species coming from me. I have known myriads to come out of a rotten post in January, and to copulate indiscriminately large and small. As far as I know I have but one species of *Orsodacna.*

HENTZ TO HARRIS.

UNIVERSITY OF N. C., Feb. 8, 1830.

You have not yet told me whether the ♂ of your *Mycetophagi* have three or four joints in their manus. Your 864 is new to me, and will be the twelfth species of the same genus if it has the above character in the ♂. It is unaccountable to me that Mr. Say did not notice it in his *M. punctatus*, which I have, and which, being the largest, displays that character almost to the naked eye. Your 864 may be his *M. flexuosus*, but I have three quite distinct species to which his description applies equally well. As in *Cicindela*, the species of this genus seem, in their markings, to have a certain type from which they do not often depart much. If you have not any ♂, will you ask Mr. Leonard to examine his insects for that purpose?

Your 333 [= "*Haltica tæniata* Dejean, teste Leconte," Harr. MSS. Catal.] is not described, to my knowledge. I brought it from the North, but it is not found here. Fabricius's description of *Galleruca petaurista* does not well apply to it. The lines on the elytra are not ferruginous, but whitish, and the epithet "*crassissimus*" does not at all apply to the thighs of that insect. I am very sure I have that species in my collection. It is a unique, gathered in North Carolina, which is nearer its home, as Bosc brought his probably from South Carolina. This insect is somewhat longer than your 333 (my 676), and nearly twice as broad; the markings are ferruginous, the elytra are punctured, so that the punctures are visible to the naked eye; the black spot on the thorax is large and transverse; and finally the thighs are *crassissimi* indeed; they are actually monstrous.

Your 464 [= "*Acupalpus conjunctus?* Say," Harr. MSS. Catal.], 74 [= "*Stenolophus cinctus* Say," Harr. MSS. Catal.], and 763 [= "*Feronia (Omaseus) stygica* Say," Harr. MSS. Catal.], you have marked *Trechus*. I have other species which certainly belong to the same genus. But I am not sure about its name. I know no more about *Trechus* than what is said of it in the Edinburgh Encyclopedia. My difficulty is that Latreille places it near *Harpalus*, among those *Thoracici* which have the "two anterior tarsi in the ♂ dilated," whereas I cannot see any distinct enlargement in any of the specimens I have. Is it so slight that it can only be regarded as a character employed to suit a natural classification? I grant that the greatest affinity of forms may be observed between them and some of my specimens of *Harpalus*, but still I am uncertain on that subject.

Your 582 you labelled *Brachinus cordicollis*, but, besides other differences, there are no black spots on the antennæ. I have begun to describe all my insects, and described this, but gave it no specific name because it is your insect. Will you tell me your present name? In size it agrees with Say's *B. cyanipennis*, but the thorax is not narrower behind than in *B. fumans*. Since I studied this genus I have found five species in my collection, viz., 13, *B. fumans*, 1211, *B. subcostatus* mihi, 1210, *B. gracilis* mihi, 14, *B. annulatus* (formerly *affinis*) mihi, 1126, your 582. Your *medius* and *minutus*, and four described by Dejean, are unknown to me. There are therefore eleven species now known.

The insect which you sent me under the name of *Dromius biplagiatus* Dejean, is, I think, a true *Cymindis*. It is probable that Dejean (if this be the insect he described) did not examine the labial palpi, which are securiform.

HARRIS TO HENTZ.

MILTON, April 3, 1830.

My 582, labelled by me *Brachinus cordicollis* Dejean, is one of five or six specimens found at different times in the same locality. Of two specimens now remaining in my cabinet, the antennæ of one are immaculate, and of the other, with the usual fuscous spots on the third and fourth joints, and with a much darker belly. These variations did not appear to justify me in separating them, when, in other respects, they agreed so nearly. I concluded that one was more matured, or had been longer transformed when captured than the other.

I have never examined the sexual organs of *Upis lævis*; but among twenty-five or thirty specimens, which at different times I have had, I never found one with the bearded mentum (labium) of *U. barbatulus*; and cannot suppose that among so many there should not have been both males and females.

I have but one specimen of my 864, *Mycetophagus flexuosus* Say. In this there are only three joints to the anterior tarsus; the first and third are of equal length, the second half as long; the first not much dilated. My other specimen is glued upon card, and the number of tarsal joints are not distinguishable perfectly, but as near as I can ascertain, there appear to be four in all the tarsi.

In consequence of Major Leconte's advice, I have about resolved to republish my descriptions of insects, and add one or two hundred new ones to them, in Silliman's Journal, the only scientific Journal (to our shame be it spoken!) now existing in the United States.

HENTZ TO HARRIS.

UNIVERSITY OF N. C., April 15, 1830.

On my 604 [= "*Orsodacna vittata* Say ?" Hentz MSS. Catal.] I can now give you farther information. I found hundreds of them this season early in March, on the blossoms of the wild plum. The ♂ is sometimes of the same size and markings as the ♀; but most commonly it is much smaller, and sometimes little more than half the size of the other sex. The ♀ varies also in size, though not so much. I am nearly convinced that Say's *Orsodacna hepatica* is the same insect with his *vittata.* It is difficult to hit on the right spot and time to find that insect, but when you do, there is no difficulty in collecting myriads. I cannot account for meeting with them formerly in mid-winter in numbers and copulating, when there was no vegetation; but this season I became convinced that they are not only found on leaves, but derive nourishment from blossoms. Both sexes vary in color and markings almost infinitely, though I think particularly the ♂. The thorax varies from ferruginous to black; the elytra from pale testaceous to black.

I have one ♂, wholly black, which measures only .19 in., and which was found in sexual connection with a ♀ measuring .33 in.!!! and which answers in most respects to Say's description of *C. vittata.* I seldom find two in connection which resemble each other in size or color; and it ought to be observed, that on account of the brevity of their existence, copulation seems to be their first object, so that one may observe hundreds in that act. They run fast, but are easily captured. I have an indistinct recollection that I formerly caught one in the summer, but since the wild plum's blossoms are out, I have not seen a single individual, although I have surveyed the flowers of many other trees.

I believe you wrote me in a former letter that you had the ♂ of my 402 (*Hallomenus? obliquatus* Fabr.?) and that the fifth,[1] sixth and seventh joints had a brush beneath. I have at last found a male which corresponds entirely with your description. The antennæ must at once distinguish that species from my 721 [= "*Helops pimelius* Fabr. teste Germ." Hentz's MSS. Catal.], from which it differs chiefly in having the sixth joint much smaller than the fifth and seventh. Notwithstanding the difference in the scutel, etc., I had some doubts, which are now entirely removed, about their forming two distinct species.

I will give you an account of an insect which has puzzled me more than any in all my entomological studies,—that coleopterous insect which diffuses a strong odor of spearmint, and is always found where that plant grows, in very wet ground, under stones. I never found it in a dry place. I believe it must belong to some osculant genus between the *Carabidæ* and *Staphylinidæ.* It may certainly be said to have six palpi, as many[2] of the *Carabidæ.* The external lobe of the maxilla, which in the insects of that family assumes the form of an additional palpus, is distinctly articulated in this with the stalk, and is capable of motion. It has two joints, the first one very small, the second long and curved inwards. The lingua is cleft or bifid, and the labium is entire. Labial palpi with four joints. The antennæ are abbreviated somewhat as in *Tachinus*, being about half the length of the abdomen. The antennæ are filiform, not very sensibly larger at the end. The thorax, which is narrower at base than I made it in the annexed drawing, reminds one of many *Carabidæ*, *Panagæus* for instance. The trophi in some respects are those of some *Staphylinidæ*, particularly the palpi. But the antennæ and feet are not those of that family. The thighs and coxæ are alike in the three pairs, the tibiæ of the first are notched, and the tarsi are always simple in both sexes. The insect is of a chestnut brown color, the head, thorax and apex of the elytra being darker, or piceous, and deeply punctured. The more I think about it, the less I know in which family to place that insect, but I hope you will help me.

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[1] The fourth has no brush beneath.

[2] I say many; because in many the lateral lobe is not much like a palpus.

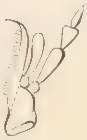


Fig. 14.

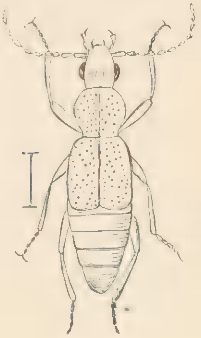


Fig. 15.

Some days ago, when visiting the same places, I found under a stone an insect, which at first sight I supposed to be a *Blaps*, from its resemblance to an European insect of that genus which you have sent me. And though it is very small, and that is not the locality, I believe, of the genus, I had little doubt that I had at last met with an Atlantic species. But when I came to examine it in the evening, I was astonished to find at first no antennæ; and, with considerable difficulty, I discovered that they were very small and concealed under the eye as in the figure, the club lamellated, of eight joints, and covered by the first. The labial and maxillary palpi have their large joint oval and larger. The insect is pentamerous, and it has wings. Can it be a *Dryops*?

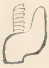
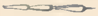


Fig. 16.

In that genus the antennæ are said to be only serrated. I went the next day to the same place, near a brook, where I had found so many treasures, to try to find more of these, and very soon I found another; though being smaller and somewhat different in habitus, I thought it might belong to another species; but, on examination, I found that its antennæ were filiform and slender, but not as long as the head and thorax; the other characters correspond very well with the preceding. I do not know the genus *Potamophilus* of Germar, and cannot refer this insect to it; but notwithstanding the vast difference in the antennæ, these two species have certainly a great affinity to each other. Both have the anterior portion of the sternum produced so as to cover the mouth. Have you any European specimens of either genus, and do you know whether *Dryops* has any resemblance to *Blaps*?

I have discovered this spring more than forty *Carabidæ*, new to me, and I have found among other interesting ones a new *Elaphrus* much larger than the *riparius?* of Say, a new *Buprestis*, related to your *fulvoguttata*, with five gold dots on each elytron, a new *Stilbolema* with a hairy thorax and two *Lepturæ*, one of which is extremely small. Several species of *Amara* and *Harpalus* have occurred which are so closely related to them that they should evidently not be separated as Latreille has done, but the two genera should be brought near each other. *H. rusticus*, which you have, is an instance of the great affinity between these two genera; but that, with several other species which I have, should constitute a new genus connecting the two.

Among the many *Staphylinidæ* collected this season are two, or probably three, species which have affinities with *Pæderus*, though probably not belonging to that genus. The eyes are very large and the head is much wider than the thorax; the antennæ and trophi correspond tolerably well with the description of that genus, except in one particular, which, however, could not be observed in a dried specimen. In dissecting a fresh specimen, I had occasion to press the body, which is very hard, upon the table, and all at once the lingua jutted out, making a proboscis or tongue much longer than the antennæ. The object is so minute that I cannot be positive, but I believe I can discover at the end of the tongue two little palpi of two joints. The maxillary ones are very long and distinct, thus: 

I have since pressed several in the same manner, and obtained the same result. These insects are found in damp places, under stones, etc. Do you know anything of them?

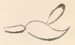
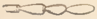


Fig. 17.

I had an opportunity this season to dissect my 447 ["*Elodes discoideus* Say," Hentz MSS. Catal.], which I think I have sent you, and I became certain that it was an *Elodes*. The labial palpi are "forked," that is to say, the third joint is inserted in the middle of the second, as in Fig. 17, the maxillary ones are thus:  and the mandibles as in Fig. 18; the penultimate joint of the tarsi is bilobed.

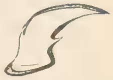


Fig. 18.

The antennæ and feet of this insect fall off so easily that it is difficult to have a complete specimen.

HARRIS TO HENTZ.

CAMBRIDGE, April 24, 1837.

I add, for the want of something better, a little table of the genera of North American species of *Elateridæ*. The characters of these genera I have not seen in any publication, and you must trust them only so far as I can give them, after a careful study of the species themselves, and a comparison of many of them with the foreign types.

1. Præsternum wide and rounded behind . . . . DRAPETES Megerle.

rufinotatus Say in litt. (*americanus* Dej. Cat.)

Hentz' Coll. No. 162. [*Elater geminatus* Say, Hentz' MSS. Catal.]

Closely related to *Buprestis*, but the thorax has the posterior spines more produced. The first, second, third and fourth joints of the tarsi are very short above, but with long lobes beneath.

Præsternum mucronate behind, 2.

2. Antennæ approximated at base, 3.

Antennæ not approximated at base, 9.

3. Nails simple, 4.

Nails pectinated . . . . . PEROTHOPS? Esch. (XYLOPHILUS? Mann and Esch.)

muscidus Say.

Hentz' Coll. No. 171. [*Elater unicolor ?* Say. Hentz' MSS. Catal.]

unicolor Say. (Hentz, No. 171, var.)

4. Tarsi lobed, 5.

Tarsi simple, 8.

5. Thorax grooved for the reception of the antennæ, 6.

Thorax not grooved for the antennæ, 7.

6. Thorax grooved beneath the margin . . . . DIRHAGUS Esch.

E. clypeatus Say.

Hentz, No. 1213. [*Elater clypeatus* Say. Hentz' MSS. Catal.]

Eucnemis amœnicornis Say.

Hentz, No. 166. [*Elater additivus* Hentz' MSS. Catal.]

Eucnemis frontosus Say.

Hentz, No. 1212. [*Elater martianus* Hentz' MSS. Catal.]

Thorax grooved at the sides of the præsternum . . . . . MICRORHAGUS Esch.

Melasis nigricornis Say.

Hentz, No. 1376. [*Elater obnuptus* Hentz' MSS. Catal.]

E. triangularis Say.

Hentz, No. 1405. [*Elater loratus* Hentz' MSS. Catal.]

E. humeralis Say.

Hentz, No. 863. [*Elater biformis* Hentz' MSS. Catal.]

7. Body slightly flattened, obtuse before, attenuated behind . EUCNEMIS? (proper, mî.)
Hentz, No. 1317. [*Elater incalidus* Hentz' MSS. Catal.]
Eucnemis calceatus Say.
E. cylindricollis Say.
Body cylindrical . . . . . NEMATODES Latr.
Eucnemis obliquus Say.
Melasis semivittatus Harr. Catal. (Hentz, No. 1152.)

8. Clypeus trilobed, elongated; body slender, subdepressed . . . New genus; founded on an undescribed species from Deerfield, Mass. The clypeus is trilobed, the thorax without grooves, and the posterior coxæ are large and triangularly produced behind, covering the base of the thighs, as they are also in *Eucnemis* proper.
Clypeus not trilobed, abbreviated; body thick, convex . . XYLŒCUS? Serville. (SILENUS? Latr.)
E. erosus Say.
Hentz, No. 862. [*Elater erosus* Say?, Hentz' MSS. Catal.]

9. Nails pectinated . . . . . . CRATONYCHUS Dej. Cat. (NOTHORA Harr. Cat.)
Nails simple, 10.
Elater cinereus Weber.
Hentz, No. 169. [*Elater æmulus* Germ. in litt. Hentz' MSS. Cat.]
communis Schönh.
Hentz, No. 134. [*Elater dispar* Herbst. Hentz' MSS. Catal.]
And some others.

10. Thorax grooved at the sides of the præsternum . . . . . AGRYPNUS Esch. (ADELOCERA? Latr. TAPHEICERUS Harr.)
E. marmoratus Fabr. (Hentz, No. 930.)
E. lepturus Herbst. (Hentz, No. 163.) [*T. februarius* Hentz' MSS. Catal.]
Hentz, No. 133. [*T. excissatus* Hentz' MSS. Catal.]
Thorax without dilated pectoral grooves, 11.
E. pennatus F. (Hentz, No. 135.)

11.	Antennæ flabellated, tarsi simple	Hemirhipus Latr. *E. fascicularis* F. (Hentz, No. 128.)
	Antennæ more or less serrated or pectinated, 12.	
12.	Head not plunged to the eyes in the thorax, but with a distinct neck	Campylus Fischer. Hentz, No. 1407. [*Elater capitatus* Hentz' mss. Catal.] *acanthus* Say. Also an insect not numbered, from "Ohio, May 15, leaping imperfectly," which is *E. septentrionalis* Harr. Cat.
	Head plunged to the eyes in the thorax, neck none, 13.	
13.	Tarsi lobed, 14.	
	Tarsi simple, 16.	
14.	Fourth tarsal joint very minute, much shorter than the third, 15.	
	Fourth tarsal joint equal to the third in length, and lobed beneath	Monocrepedius Esch. *E. lobatus* Say. (Hentz, No. 167.) *E. vespertinus* Fabr. (Hentz, No. 151.) *E. dilectus* Say. (Hentz, No. 141.) *E. bellus* Say. (Hentz, No. 154.)
15.	Antennæ pectinated in the males, second joint very short, almost globose; second and third tarsal joints lobed below, the lobes nearly equal . .	Dicrepidius ? Esch. Hentz, No. 1404 ♂. [*Elater pineus* Hentz' mss. Catal.] Hentz, No. 1099 ♀. [*Elater recubans* Hentz' mss. Catal.] An *D. palmatus* Dej. Cat.?
	Antennæ serrated in both sexes, second joint obconic; lobe of the second tarsal joint very short; third tarsal joint with a very distinct longer lobe	Athous Esch. *E. bilobatus* Say. Hentz, No. 147. [*Elater pædagogus* Hentz' mss. Catal.] *Pyrrhus* Hbst. Hentz, No. 159. [*Elater prosectus* Hentz' mss. Catal.] *baridius* Say. Hentz, No. 865. [*Elater Thomasi* Hentz' mss. Catal.]
16.	Eleventh joint of the antennæ abruptly contracted at tip, 17.	
	Eleventh joint of the antennæ not abruptly contracted at tip, 18.	

17.	Anterior tarsi of the ♂ with four dilated joints, furnished with brushes beneath; scutel horizontal; thorax flattened, oblong quadrate, with two ocellated spots	ALAUS Esch. *E. oculatus* Linn. (Hentz, No. 126.) *E. myops* Fabr. (Hentz, No. 127.)
	Anterior tarsi of the ♂ not perceptibly dilated; scutel nearly vertical, thorax thick, convex, narrowed before	STEATODERUS Esch. *E. abruptus* Say. *E. attenuatus* Say. (Hentz, No. 158.) Hentz, No. 1088, not determined. [*Elater luctifer* Hentz' MSS. Catal.]
18.	Third joint of the antennæ at least twice as long as the second, 19.	
	Third joint of the antennæ less than twice the length of the second, 21.	
19.	First tarsal joint longer than the second and third together; body short and thick . .	AMPEDUS Megerle. *E. discoideus* F. (Hentz, No. 137.) *lugubris* Beauv. (Harris, No. 804.) *apicatus* Say. (Hentz, No. 954.) *erythropus* Say. (Hentz, No. 1076.)
	First tarsal joint not longer than the next two; thorax and body longer, 20.	
20.	Antennæ of the male pectinated	CTENICERA Latr. I have seen only one native species (*E. anchorago* Randall), which was brought from Maine.
	Antennæ in both of the sexes serrated	LUDIUS Latr. *E. spiraculatus* Harr. Cat. (Hentz, No. 140.) *hieroglyphicus* Say. (Hentz, No. 143.) *vernalis* Hentz. (Hentz, No. 129.) *inflatus* Say. (Hentz, No. 139.) *morio* F. (Hentz, No. 136.) *lævigatus* Hbst. (Hentz, No. 130.) *appressifrons* Say. (Hentz, No 753.) *circumscriptus ?* Germar. Hentz, No. 1406. [*Elater spiculatus* Hentz' MSS. Catal.]
21.	Scutel large, 22.	
	Scutel moderate, 23.	

22.	Scutel cordiform, the region about it much depressed . .	Cardiophorus Esch. *E. convexus* ??? Say. (Hentz, No. 957.)
	Scutel ovate, convex; body short, thick, oval	Oophorus Esch. *E. dorsalis* Say. (Hentz, No. 138.)
23.	Antennæ distinctly serrated, body moderately elongated . .	Limonius Esch. *E. cylindriformis* Say. (Hentz, No. 145.) *E. plebejus* Say. (Hentz, No. 1154.) *E. limbalis* Hbst. (Hentz, No. 152.) *E. quercinus* Say. (Hentz, No. 161.)
	Antennæ hardly serrated, nearly filiform, 24.	
24.	Præsternum produced and covering the mouth entirely; body short, thick; tibiæ spiny; mesosternum grooved . . .	Cryptohypnus Esch. *E. abbreviatus* Say. (Hentz, No. 956.)
	Præsternum not closing the mouth entirely, 25.	
25.	Fourth to tenth joint of antennæ increasing in length; body elongated, slender, almost linear	Dolopius Megerle. *E. silaceus* Say. (Hentz, No. 164.) *inquinatus* Say. Hentz, No. 142. [*Elater lancearius* Hentz' MSS. Catal.]
	Fourth to tenth joint of the antennæ subequal, 26.	
26.	Fourth joint of tarsi not much shorter than the third; body short, thick, robust, and very convex	Agriotes Esch. *E. obesus* Say. (Hentz, Nos. 144 and 148.)
	Fourth joint of the tarsi very minute, its base received within an emargination of the third; body slender, almost linear	Adrastus Megerle. *E. bigeminatus ?* Say. Hentz, No. 156. [*Elater exclamator* Hentz' MSS. Catal.] *E. pectoralis ?* Say. Hentz, No. 153. [*Elater scutatus* Hentz' MSS. Catal.]

HARRIS TO HENTZ.

CAMBRIDGE, Nov. 6, 1839.

A species of *Cicindela* has lately been sent to me from Ohio, which at first I supposed to be your *splendida.* It turns out, however, to be distinct, and is the *limbalis* of Klug, (Jahrbücher, Bd. I, p. 29). It is still more closely allied to *purpurea* than is your *splendida.* The following description will enable you to recognize *limbalis*, if it should occur in your vicinity.

C. limbalis Klug. Above, crimson, the thorax and elytra margined with green, a humeral and post-humeral white dot, widely interrupted terminal white lunule, and an intermediate abbreviated sinuous white band on each elytron. Labrum white, and three-toothed on the edge. Head and thorax crimson, the latter with a broad anterior and posterior margin, and the narrow lateral edge green. Elytra crimson, with the narrow sutural edge and broad entire outer margin green; a white dot on the humeral angle, and another just behind it near the outer margin, both sometimes obsolete; a transverse white dash on the tip, with a small dot just before it, near the outer margin, and an intermediate flexuous white band, which does not attain the outer margin nor the suture.

Variety. The humeral and post-humeral dots more or less obsolete, and the intermediate band reduced to a submarginal, abbreviated, transverse, white dash.

Observation. This species differs from *purpurea* in the form of the intermediate elytral band, in having the outer green margin entire, and not sinuated within, and in wanting the coppery crimson outer edge of the elytra, etc. From *splendida* it differs in having the head and the disk of the thorax crimson, the humerus more rectangular, and the coleoptra rather longer, and not so sensibly dilated in the middle, etc. The intermediate band in *limbalis* is nearly of the same form as in *patruela*; but I have not seen it so in any specimen of *splendida*, in which, on the contrary, the intermediate band is an abbreviated submarginal transverse line, as in the variety of *limbalis*. I should not be surprised if individuals of your *splendida* should occur with the intermediate band, as in *limbalis*.

Dr. Zimmerman coincides with me in thinking that *purpurea*, *splendida* and *limbalis* are three true species, and not varieties of one or two species.

Your *Anchomenus collega* proves, on comparison with specimens from Pennsylvania, where it is quite common, to be the true *extensicollis* of Say and of Dejean. The Massachusetts species, which heretofore I have supposed might perhaps be the *extensicollis*, is not found in Pennsylvania, and must bear the name of *proximus*, which I proposed for it in the New England Farmer of November 14, 1828. I am told that it is the "*A. Lecontei* nov. sp." of the third edition of Dejean's Catalogue.

A careful comparison of our Northern insects with species from Pennsylvania, will enable me to identify with certainty many of Say's species, respecting which heretofore I have had doubts, and will probably show that in Massachusetts and New Hampshire there are many species closely allied to, but distinct from, their co-species of the Middle and Southern States. This comparison will also enable us to clear up several errors into which Dejean has fallen, from not being sufficiently acquainted with English to read Say's description. For example, *Harpalus agricolus* Say, turns out to be the *Anisodactylus luctuosus* of Dejean; *Harpalus carbonarius* of Say is the *Anisodactylus agricolus* of Dejean; and *Anisodactylus nigritus* of Dejean is a Northern species which Say does not seem to have known.

HARRIS'S CABINET NUMBERS.

6	Elater communis Schönh.?
74	Stenolophus cinctus Say.
96	Feronia pallipes Fabr.
128	Tenebrio molitor var. americanus Peck.
143	Upis fulvipes Herbst.
146	Elater cinereus Weber.
292	Tenebrio badius Say.
312	Upis reticulatus Say.
313	Upis lævis Oliv.
316	Tenebrio punctulatus Harr.
333	Haltica tæniata Dej.
427	Upis rugosus Harr.
428	Upis anthracinus Knoch.

429	Tenebrio reflexus Say.
464	Acupalpus conjunctus Say.
582	Brachinus cordicollis Dej. = 1126 Hentz.
586	Feronia lineola Fabr.
587	Feronia pallipes var. Say.
679	Orsodacna hepatica.
715	Uloma fodiens Germ.
763	Feronia(Omaseus)stygica Say.
765	Dytiscus carolinus Dej. = 78 Hentz.
777	Scirtes tibialis Harr.
798	Upis rufipes Say.
864	Mycetophagus flexuosus.
903	Tenebrio interstitialis Say.
906	Feronia limbata Say = 49 Hentz.
906$^{\text{bis}}$	Feronia limbata var. Say.

HENTZ'S CABINET NUMBERS.

3	Cicindela decemnotata.
13	Brachinus fumans Dej.
14	Brachinus annulatus.
49.	Agonum palliatum Dej. = 906 Harr.
64	Dicælus elongatus?
78	Dytiscus verticalis Say? = 765 Harr.
89	Philonthus flavolimbatus Harr.
90	Pæderus littorarius Grav.
128	Elater fascicularis Fabr.
133	Tapheicerus excissatus.
133?	Elater pennatus Herbst.
143	Elater navicellus.
163	Tapheicerus februarius.
201	Œdemera Rœmeri.
209	Chauliognathus marginatus.
217	Malachius scincetus Say.
220	Malthodes?
238	Opilus? coccineus Harr.
239	Thanasimus putans.
240	Tillus terminalis Say.
250	Necrophorus æqualipes.
373	Blaps.
398	Cistela sericea Say.
402	Hallomenus? obliquatus Fabr.?
410	Œdemera thoracica? Fabr.
447	Elodes discoideus Say.
448	Diaperis bicolor Fabr.?
604	Orsodacna vittata Say.
648	Doryphora decemlineata?
676	Haltica tæniata Dej.
721	Helops pimelius Fabr.
725	Stenocorus quadrigeminatus Say.
740	Crataeanthus pennsylvanicus Dej.
745	Triplax thoracica Say.
751	Eustrophus [bicolor].
754	Uleiota dubius? Fabr.
762	Allied to Cucujus flavipes.
776	[Phymaphora pulchella Newm.].
799	Clivina pallida? Say.
807	Mycetophagus punctatus.
808	Near Malachius.
814	Elodes? fragilis.
860	Tillus? Priocera?
874	Priocera undulata Say.
907	Dicælus.
949	Allecula.
1001	Pasimachus marginatus Dej.
1004	Tenebrio badius Say?
1125	Cicindela rufiventris Dej.
1126	Brachinus cyanipennis Say? = 582 Harr.
1210	Brachinus gracilis.
1211	Brachinus subcostatus.

CORRESPONDENCE

BETWEEN

THADDEUS WILLIAM HARRIS

AND

FREDERIC ERNST MELSHEIMER.

CORRESPONDENCE.

HARRIS TO MELSHEIMER.

CAMBRIDGE, Nov. 22, 1839.

I anticipate very great advantages from a comparison of the insects of Pennsylvania, and of the States further south, with those of New England. The little experience which I have already had in this task, proves to me that several of the species described by the old writers, and a still larger number described by Mr. Say and Dejean, which heretofore we have supposed to be identical with species found in New England, are really distinct. The New England species, though closely allied, and not to be distinguished but by actual and careful comparison, will, in many cases, turn out to be new or undescribed species.

MELSHEIMER TO HARRIS.

DOVER, YORK CO., Feb. 28, 1840.

We have raised several times specimens of the *Noctua Epimenis* Drury. You state that its color is brown; recent specimens are of the deepest black; its larva is a half looper. We have never seen it on the wing.

My specimen of *Mastigocera vespina* differs, according to your description, from yours, in being cyaneous where yours is black. It is, however, the same. I received my specimen from Dr. Hornbeck of the West Indies. But unless I should be much mistaken, we have also a species of this genus in our country, and we have captured it twice, but it was each time destroyed during its preparation for the cabinet. I was much puzzled to place it appropriately, on account of the peculiar form of the antennæ, which are, however, not quite so robust as in *vespina*, and the thickest portion is more toward the middle than in that species. It is deep black and densely pilose.

My specimen of *Ægeria omphale* differs somewhat from yours, and more so from Say's figure.

We raise every summer specimens of *Glaucopis pholus*; we find its larvæ on the lichens growing on the trunks of hickory trees.

In all my specimens of *Sphinx hylæus*, the hind wings are more black than white, and, in many, the white line above the eye and sides of the thorax is wanting. It appears to me that your *Philampelus Hornbeckiana* must be closely allied to, if not the same as, *Sphinx fasciata* of Sultzer; vide Abgekürzte Geschichte der Insecten, I, p. 157, pl. xx, fig. 1.

I cannot inform you whether the female of *Oiketicus* is winged or not, but I am fully convinced that we never raised a female, or a specimen, different in the antennæ from that in your possession. The following is an accurate and correct description of the larva, transcribed from my entomological diary:

"Head small, entirely withdrawn when the larva reposes; body oblong, quadrate, above longitudinally subconcave, very densely clothed with yellow ferruginous, sometimes reddish brown hairs; vesture very short and even; upper portion of each side dilated, and with six appendages, those on the anal, middle, and third segments, longer than the others; all the appendages clothed as the body, fringed at the edges, and recurved at the tip; lower portions of the sides each with a longitudinal series of globular tubercles, densely beset with very short setæ; body beneath reddish; feet sixteen, very short, frequently withdrawn. Appendages not essential. Food, the leaves of white and red oak, chokecherry (*Prunus virginianus*), etc. Time of appearance, beginning of September. Manners, slow of motion, eats in daytime, and sparingly; does not bear confinement well,—at least, few will encase themselves when confined. Encases itself about the middle of September, sometimes later; case membranaceous, brownish, suboval, somewhat less than five lines in length and three lines in breadth, affixed to a small twig. Transforms into a pupa the following April, and the moth is developed about eight weeks after. Length of the larva ten lines generally, when full grown. Breadth seven lines, across the appendages generally fourteen lines."

MELSHEIMER TO HARRIS.

Dover, Dec. 23, 1840.

I was entirely at a loss where to place the species of *Perophora* which you were pleased to dedicate to our name. With respect to the habits and manners of its larva it approaches the genus *Psyche*; but as regards the characters of the perfect insect, the difference between it and that genus is too essential to associate or unite them. As I found the larvæ of this moth always in their adult or mature state, I cannot say whether they always live in one pod, or form larger ones, as they increase in size; but it is very probable that in some of their moultings they fabricate new ones. It is really very amusing to observe the interesting manners of these larvæ. They have never occurred to us before the close of autumn; when confined they bore their confinement well, and never refused their food, the leaves of red and black oak coppice or sprouts of six or eight years' growth, as long as the frost had not injured it, which, however, generally happened soon after they were found. As soon as their food was withheld, or offered in an injured condition, they left the leafless twigs, retired to the sides of the compartments in which they were confined, secured their pods slightly by a few threads, and made no preparation to enter into the pupa state (which would be inferred from the circumstance that the anterior and posterior aperture of their domiciles remained unclosed), but remained in the larva state during the winter. About the latter end of March, after crawling about their confinement for a day, apparently in search of a more natural place to enter into the pupa state than what their small compartments afforded, they rested where they had passed the winter, attached themselves now more firmly to their resting place, closed both extremities of their pods, and about midsummer assumed their final or imago state. Some of the larvæ were repeatedly dislodged from their cases, and then placed on a leaf of their food, with their empty cases beside them; but in this exposed state they remained quiet, not attempting to eat or reënter their empty pods; during the night following the day of their expulsion, they fabricated new pods out of the leaves on which they had been placed. You have doubtless observed the curious little door, or circular lid, hinged at the anterior aperture of the case. The posterior one through which the obliquely truncated tail of the larva protruded before it assumed the pupa, has, as may be expected, no such lid, but is permanently closed.

I have several times raised the beautiful moth which you have so accurately figured in your letter under 716 [*Notodonta sexguttata* Harr. See beyond, Harris to Doubleday, March 24, 1849]. The moth and its larva are also rare with us. The following is a detailed description of the larva and its transformations, which I copy from my entomological diary: "Head small, free, polished, blackish, sparingly beset with white setæ; cheeks each with two obsolete, roundish, red spots;

occiput with two elongated tubercles; first three segments blackish-brown, slightly tinged with reddish, and with small tubercles above, from which arise long fuscous hairs; three following segments black, polished, and each above furnished with a broad hump, surmounted with elongated, setigerous, black tubercles; seventh, eighth and ninth segments polished, white, veined with black above, and with minute tubercles, each of which furnishes a short white hair; tenth segment black, polished or shining, veined with white, and tuberculated; penultimate blackish, furnished above with a large, flat-topped hump, studded with piliferous black tubercles; tail black, veined with white, and tuberculated; an obsolete, white, dorsal line; pectoral feet reddish-brown, varied with black; abdominal or spurious feet very long, anteriorly blackish, laterally white, with black lines; body beneath blackish, varied with reddish. Length twelve lines; breadth one and one-half or two lines. Food, the leaves of winter-berry (*Prinos verticellatus*). Time, last of August. Transformation of larva into pupa, September, above ground in dry wood. The larva gnaws a cavity in the interior of a round dry stick, and closes the entrance with a firm web. The perfect insects were disclosed in June, after remaining in the pupa state almost two years. Pupa naked, subcylindrical; terminal segments blunt, without a spine. The manners of the larva are somewhat remarkable. In repose the anterior portion of the body is elevated, resting only on the four hindermost pair of pro-legs; and when the larva is at any time disturbed, it moves the elevated part sideways very rapidly." Your figure represents a female specimen. Thon, in his Archives, has figured an insect almost identical with 716, which he placed in the genus *Notodonta.*

MELSHEIMER TO HARRIS.

Dover, York Co., Pa., Feb. 14, 1842.

The larvæ, labelled *Agarista octomaculata*, which you received from me, are identical with specimens which produced no other than that moth. It resembles indeed the larva of *Eudryas grata* in its coloring and markings so much, that before I was acquainted with its manners, I have frequently taken the one for the other, and was not aware of confounding them until the moths were disclosed. If the larva in question was that of *Eudryas*, my collection would certainly contain specimens of the same; but which is not the case, as it contains no other than *E. grata*, and a doubtful one, your 69. The specimens you received from me are not strictly naked, but sparsely covered with short, minute, white hairs. In its manners it differs in many respects from that of *E. grata*, particularly in its mode of concealing and sheltering itself; for this purpose it rolls a leaf in a conical, or rather globular form, in which it is found rolled in a ring during the day; but in the night, or in cloudy weather, it feeds upon its temporary abode, or retires from it, and feeds upon an adjoining leaf. When it is confined it forms no shelter, and feeds at all hours. Like the larva of *E. grata*, it feeds exclusively on the cultivated grape-vine, and, like it, changes in the earth, but in what manner, I have as yet neglected to ascertain.

MELSHEIMER TO HARRIS.

Dover, Nov. 24, 1842.

Among the Bombyces which I reared, was a specimen of the beautiful, and hitherto to us, rare *Dryocampa rubicunda*. I conjecture that there must be two broods of the larva in the season of its occurrence, as I captured two specimens of the larvæ towards the end of July, and again many hundreds about the end of September. One of the two specimens which I captured in July was injured and perished; the other produced the imago sometime in August. The larvæ of the September brood have passed into the pupa state. The larvæ I found only on the maple sprouts (*Acer rubrum*) of three or four years' growth. In consequence of its having escaped my observation until last summer, I infer that its periods of occurrence in numbers must be remote, and the intervening years produce but few specimens. The more I become acquainted with the economy of insects, the stronger becomes my belief that all insects have their periods of increased numbers, which, in some instances may be unfixed and irregular, but in others, their periods of numbers are as fixed and regular as that of the *Cicada septemdecem.* In the summer of 1832 I met with the larva of *Saturnia Io* for the first time, and then in countless numbers, on the top of oak saplings on a hill; since that time I failed not to visit that place, and similar localities, every summer, but was always disappointed in meeting with a single specimen, either of the larva or perfect insect.

CORRESPONDENCE

BETWEEN

THADDEUS WILLIAM HARRIS

AND

EDWARD DOUBLEDAY.

CORRESPONDENCE.

DOUBLEDAY TO HARRIS.

[No date; received May 22, 1839.]

The descriptions in the Suites à Buffon by Boisduval, are in general good, but I do not like his character of *Marcellus* and *Ajax*, which are my two species. Cramer's figure evidently is *Marcellus*. Children has only bad specimens, one of each, and these both named by G. R. Gray, *Ajax*. Boisduval calls Drury's *Protesilaus*, *Sinon*. Now Drury's figure is a species he has not described, and is very correct, not incorrect, as Boisduval asserts. Boisduval evidently never saw Drury's species, which I have from Jamaica. Boisduval is right in considering your *Callidryas* as distinct from the more Southern one. Of *Anthocaris genutia*, Newman has two males and a female from Edwards County, Illinois, collected there some years since by W. Clark. I notice that Boisduval says it is found near Boston, and remarks truly that notwithstanding its falcated wings, it is the nearest species known to *Cardamines*.

You will remember I told you that I had a *Terias*, very distinct from any known to me, which I captured near Alton, Ill. This is not a *Terias*, but a *Nathalis Iole* Boisd. Children has it from the W. Indies. Boisduval says Mexique. I have but few, so send you only two of it. My *Thecla*, 28, seems to be the *acis* of Drury.

When at Charleston, I observed on the branches of *Cupressus thyoides* a number of cocoons composed of silk, intermixed with fragments of the shoots of the *Cupressus*. There were hundreds on some trees. Within was a white larva, as of some internal feeder. The first thoracic segment horny, the two anterior pairs of legs small, the third larger ; prolegs very small. None of those I saved turned, but Dr. Bachman gave me the perfect insect, and what should I find out since my return that it is but the *Sphinx ephemeræformis* of Haworth, *Thyridopteryx ephemeræformis* of Stephens (Ent. Soc. Trans., Vol. 1). [See beyond, Harris to Miss Morris, Sept. 25, 1850.]

Children has another *Alypia* from Nova Scotia. I will try and describe this and my *Egeria* and *Trochilium* in Charlesworth for May. Is your *Troch. tipuliforme* really ours?

And now to go on to the Bombyces. Is Boisduval's (in Guérin) *Sericaria sanæceps* the same as Drury's *ministra*, Vol. II, pl. xiv, fig. 3? Of the *Arctia Lecontei* of Boisd. (Guérin, Icon. R. A.) I have all manner of varieties; your *militaris* is another one. The white spots becoming confluent in a different manner, will account for all these variations. I have made out a difference in the species so close to our *Caja*, which will serve to distinguish it.

You inquire about the habits of *Ctenucha semidiaphana*. I took it in September in Illinois on flowers, especially on the different species of *Solidago*, flying by day. Again I took it in Florida by night, for they used to fly to my lamp. I do not remember to have taken one by day there. *Ægeria omphale* I took once at night, once flying by day in a sunny spot in the midst of a thick hummock.

DOUBLEDAY TO HARRIS.

Epping, June 4, 1839.

A few days since I found at a bookseller's, eighty-four drawings by Abbot, containing one hundred and fifty figures of Georgian Coleoptera, and about three hundred and fifty of Lepidoptera. They are bound in a small folio volume, and did not belong to Swainson. As many of the things figured are new to me, I thought they might not be known to you either, and so gave seven guineas for them, and brought them away, determining to send them as a trifling present to you in my next parcel. I hope they may contain something new to you.[1]

I have also some few moths and one *Hipparchia* sent by Abbot many years ago to England, and expect soon to get some more, as the late Mr. Milne's collection will soon be for sale, and he purchased many things of Abbot.

I have nearly finished the species of Bombyces I have to describe. One thing troubles me. I am obliged to make many new genera. Of these I fear you will have some species, and thus I shall still be intruding on your territories. I have been thinking of sending to you all my *Noctuæ* that you do not possess, or have not seen, and all the remarks I can find to make upon them. In fact, I have nearly resolved thereon. I had rather your papers were as complete as possible, and it would be far more advantageous to science that you should do them. You, too, can go on better, from greater knowledge of larvæ, etc.

Now as to the Bombyces. You will remember a small one like a *Cossus* (104). This is not a *Cossus*; in *Cossus* the antennæ are thick, and simply pectinate; in this they are bipectinate. This must form a new genus. A single joint in *Cossus* would be thus, ◁ — a broad lamella; in this it is thus, <

Then comes my 60 and 56 and 57. These are evidently allied to *Stauropus*. Till last Sunday I never had a chance of examining the ♂ of this genus, having only the ♀. However, a fine ♂ of *S. fagi* has come out in my brother's breeding cage. It certainly is slightly different, especially in having a very tufted abdomen, as has the ♀. Of my 60, 56 and 57, I have only males. But I have two or three nearly allied species of a grayish hue, which I took at Trenton Falls in '37. Of these I have females. They differ much from the ♀ of *Stauropus*. You know what an odd larva *Stauropus* has. If I knew the larva of these I should know what to do. As it is, I must either make a new genus in weak characters, or put them provisionally in *Stauropus*,—make them *Stauropus ad interim*, as the French make ministries.

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[1] [The volume is now in the Society's possession.]

Then comes a genus for which I mean to propose (if I describe it) the name of *Chætæessa*, from a singular tuft of hair arising on each side at the base of the antennæ, and meeting over the vertex so as to form two sides of a triangle, of which the vertex is the base. The palpi are triarticulate, rather long, second joint the longest, stout, rather compressed. The antennæ are beautifully bipectinate for about two-thirds of their length. I have only one species with rufo-ferruginous anterior wings, having a broad, transverse, whitish or cinereous band across the middle. There are some little black markings near the nervures.

I have had a great lot of insects from Wilmington, Del., but nothing new to me save *Chremastocheilus Sayi*, and one or two *Sphinges*, all of which you have. I find that *P. Glaucus* occurs there; there were two amongst a lot of *P. Troilus*.

DOUBLEDAY TO HARRIS.

Epping, June 26, 1839.

As to *Callimorpha Lecontei* and *militaris*, I can only say that at Trenton I took a series of them running one into the other, so that one could not draw the line to divide them. Variable insects do not vary in some localities. *Harpalus æneus* does not vary with us; at Welton, on our coast, it varies in all manner of ways. Five species were formerly made of these varieties. In a box of insects I got a few days since from near Wilmington, Del., is a species I do not remember to have seen. The upper wings are pale cream color, with brown-black markings. The under wings plain yellow ochre color. [See a figure in a letter from Doubleday to Harris, Nov. 16, 1840.] In this box were several specimens of *P. Glaucus*. I had just before got some specimens of *P. Glaucus* from the town of Wilmington; these were from Centre or Centreville, about six miles off. The man who obtained them sent me a great number of cocoons of *Saturnia Cecropia*, *Polyphemus*, and a few of *Promethea*. I observe these (that is, the first two, for many are now out,) always sit, when quite at rest, with their wings back like a butterfly. When disturbed a little, they sit with the wings flat, and partially expanded.

DOUBLEDAY TO HARRIS.

EPPING, Aug. 28, 1839.

There is a drawing without any larva or any note attached (in Raddon's fac-simile of drawings by Abbot), of what I suppose to be *Smerinthus modestus* ♀, but much larger than you describe it, being five and three fourths inches in expanse. The wings are more pointed than in any of the others, and resemble a little the true *Sphinges*.

I would describe it as follows: Superior wings pale ashy at the base, a broad, irregular, transverse, fuscous band at the middle, in which is a triangular whitish spot, then a rather narrow transverse, pale ashy fascia, followed by a still narrower fuscous band. The remaining part of the wing brownish-ashy, the nervures, a spot at the apex and transverse band commencing at the third nervure from the apex, and terminating at the anal angle, pale ashy. The ash-colored portion at the base of the wing has a faint fuscous band near its middle. Posterior wings ash-colored, a bright rosy spot near the base, a large pale rosy space towards the outer margin, and near the anal angle a blue marginal spot edged above with black-blue. Thorax and abdomen gray.

Sphinx cingulata; I have one bad specimen taken at Wilmington, Del. *Sphinx carolina*; many from Wilmington and New York. Here you have omitted a species figured by Donovan as *Sphinx carolina*, and described by Haworth as *S. quinquemaculatus*. It differs materially in the markings of the abdomen and thorax, and also in the underwings; I have examined some scores of specimens, and am sure that they are distinct species. The larva (Abbot's drawings) is pale green, the four anterior segments with many white dots, the head with two black lines, a black spot on the back of the first thoracic segment, a longitudinal white line edged below with black, extending from the beginning of the second thoracic segment to the tail. There are eight white lateral stripes edged with black above, the seventh of which reaches the black caudal horn. There is another white line just at the base of the anal prolegs. True legs black, prolegs black at the base and apex, green in the middle.

Close to this is a large and beautiful species which I have not got, but know as a Jamaica species, *Chionanthia*, I think. It is in Abbot's drawings. It is not in Smith's Abbot. *S. drupiferarum* I do not know. *S. Kalmiæ*; two specimens, Trenton Falls. *S. gordius*; bad specimen, New York. *S. cinerea*; two specimens, Trenton Falls.

And here are two species which puzzle me, *S. sordida* and *Hylæus*. *S. sordida* I do not know. *Hylæus* perhaps I have; it is dark fuscous on the anterior wings, irrorated with ferruginous, especially towards the middle of the interior margin. There is a small white spot at the base, then not far from the base two white, zigzag, transverse strigæ enclosing a black one; a white central spot, a zigzag black streak beyond the middle, followed at a short distance by two zigzag, transverse, white streaks enclosing a black one. There is a black mark at the tip, and three whitish clouds on the margin. Posterior wings smoky black, a large white spot near the base, and two indistinct whitish strigæ reaching from the anal angle to the middle of the wing. Cilia of all the wings spotted with black and white. Abdomen clothed with mixed ferruginous and black scales, incisures irregularly white. Exp. alarum two and one half to three inches.

S. plebeja; four specimens, Wilmington, Del.

S. coniferarum; only known to me by Abbot's drawings.

S. Ello; specimen from W. Indies. Stephens has described a closely allied species, as *S. pœcila.* It probably is American; the country was not known,—being found in an old cabinet, marked *pinastri.* Now as our collectors in former days were very apt to place foreign species in the room of allied British species, probably this is an American species placed under a wrong name to fill up a gap.

In Abbot's drawings there are figures of two Sphinges of this group which I do not know. One is brownish and gray on the anterior wings, with three darker, transverse, zigzag streaks before the middle, and a dark spot with a pale central one on the middle. Between this and the apex are fine transverse streaks, composed of darker spots often united together, between the second and third of which is a whitish cloud, and at the apex is a black streak pointed inwards. The posterior wings are of the same color, with these transverse clouds of a darker color. Cilia spotted with dark brown. Thorax brown-gray, with three lateral darker lines, and a black spot behind margined anteriorly with white. Abdomen the same as thorax, with a central dark line and five darker spots. Larva on the *Catalpa.* Above black, two white spots on the back of the first three abdominal segments, remainder with one irregular, white, dorsal spot. Anal horn recurved, slender, black; below and on the sides the larva is whitish, shaded to a very pale green on the legs, with some irregular black marks. Pupa pale brown. The larva is very singular.

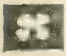

Fig. 19.

The other is a larger species, expanding four and one half inches. Its superior wings are pale gray, with a slight yellowish tinge. Immediately at the base, on the anterior margin, is a small fuscous spot, and a little farther another, or rather a very short striga. Then come three transverse, waved strigæ, crossed by a long black dash. Three other similar strigæ are placed a little beyond the middle. In the disk is a white round spot, below which is a second black streak. Two similar black dashes cross the three posterior transverse strigæ, and at the apex is a third, descending towards the middle of the wings. From this, a row of five short black dashes extends to the inner margin, and close to the outer margin are five X-shaped dusky marks. The posterior wings are pale fuscous, with the nervures and three transverse fasciæ darker. All the ciliæ whitish, spotted with brown. Thorax gray, with the sides and anterior margin marked with two dark lines, between which anteriorly is a short transverse one; behind are two curved black lines margined with yellow. Abdomen gray, with a central, and two lateral series of fuscous spots. Larva whitish green, spiracles circled with red. Seven white lateral streaks, caudal horn yellow. Pupa dark brown. I am sure I found this larva in the West.

Philampelus vitis I have not got. *P. satellitia*, one or two specimens from New York.

Chærocampa pampinatrix; I have two specimens taken in Florida and Wilmington, Del. *Azaleæ* and *versicolor* I have not. *Tersa* belongs to a West Indian genus; in Abbot's drawings is a figure of a *Sphinx*, I think of this genus, but there is no larva to determine it. Its exp. alar. is 4$\frac{3}{4}$; length 2$\frac{3}{4}$. Upper wings olive-green, with a subtriangular darker patch near the middle.

Two abbreviated transverse lines very near together, at the inner extremity of which is an irregular ferruginous spot. The nervures beyond the middle are faintly ferruginous, the second, third, fourth, fifth and sixth, with a black spot a short distance from the anterior margin. Posterior wing with the anterior margin and disk bluish, a white spot bordered internally and below with black, close to which is a red spot. The posterior, and part of the inner margin, is straw-colored, widest towards the anal angle, where are two narrow dark lines. Between this yellowish margin and the blue of the anterior margin is a black spot, crossed by four yellowish nervures. Head, thorax and abdomen, dull olive green, quite uniform throughout. Antennæ yellowish. Tail as in the annexed drawing. There is another drawing, I believe, representing its lower surface. This is pale ferruginous, or buff, with a dark cloud and white central spot on the anterior wings, the margin clouded with a darker hue. *D. lineata*; several specimens from Wilmington, Del. *D. Chamænerii* I do not know.

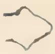

Fig. 20.

Of *Pterogon gauræ*, there is one specimen collected by Abbot, now in our Club Cabinet. It differs from his drawing of the male in having the wings less pointed, and being rather duller colored, probably faded.

Thyreus nessus; one specimen, Trenton Falls.

The only *Sesia* I have is *Pelasgus*, from Wilmington and Trenton Falls. Abbot represents the larva on a *Viburnum?* I think, *V. prunifolium*. It is pale green, spotted finely with white. A stripe down the back, a transverse line, eight spiracles, the feet red and a nearly white lateral stripe. Pupa nearly black.

Trochilium. Of this genus I have one species, a very worn specimen. It is, I think, *T. tibiale*, but has the last segment yellow. Your *tipuliforme* I think is not ours. I have three species you do not mention. In Abbot's drawings are two species I do not know, probably both *Trochilia*. Of one, ♂, the anterior wings transparent, margin and nervures black, a transverse orange bar beyond the middle. Posterior wings with the margin black, and a short yellow line near the middle of the anterior margin. Thorax with sides black, anterior and posterior margin orange yellow. Body black, with eight yellow rings, antennæ ferruginous, legs yellow; no tuft at the tail. Below is a ♀, whether of the same species I do not know. Anterior wings dark brown, with an abbreviated, transverse, orange line beyond the middle, and a transparent spot on the posterior angle; the base slightly clouded with yellow. Posterior wings with only the outer margin, and a spot on the anterior margin, brown. Thorax brown, with the sides and posterior margin tawny yellow. Abdomen black-brown, with two rings near the base, the base yellowish orange, and two small lateral tufts of the same color near the apex. Antennæ black at base, apex orange; legs, except the yellow tarsi, orange.

Pholus epimenis cannot be near to *Glaucopis*. It is close to *Brephos*. The larva, according to Abbot, feeds on *Bignonia radicans*. It is pale, with black lines, and though having the full complement of legs, seems to be a semilooper in its walk, like *Brephos*. I shall soon send an article to Charlesworth, with the new species of this group.

I find I have a specimen of *S. sordida* from Wilmington, Del., and amongst the insects in our Club Cabinet collected by Abbot, is a specimen near *coniferarum*, but apparently distinct.

Then amongst the *Bombyces* of Abbot's drawings are many things I do not know, and I have got much information I wanted from these drawings. There is a good figure of both male and female of my 104, but no larva. The female (for as they are put on the same paper, and are a ♂ and ♀, I suppose they belong to one another), is very different in marking from the males. Anterior wings lead-colored, with various strigæ and spots, the base and an irregular transverse band beyond the middle, white; outer margin broadly brown from the apex nearly to the anal angle, with the tips of two of the nervures whitish, and with a dark cloud or two near the middle. Posterior wings plumbeo-fuscous. Thorax nearly white, with the anterior margin narrowly black. Head black, antennæ pale and pectinated. Abdomen stout, slightly tufted, plumbeous, paler at the base. The antennæ might lead us to suppose it a ♂, but the abdomen disproves this. I cannot doubt that it is the ♀ of my 104. [Further notes upon the same insect, extracted from Doubleday's MSS. are given below.[1]]

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[1] Genus. ?

Antennæ as long as the thorax, bipectinate their whole length.

Palpi two, distinct, triarticulate, second joint longer than the first, both rather stout, scaly, setose at the base; terminal joints small, acute, scaly.

Maxillæ none.

Eyes large.

Wings entire, superior ones rounded at the apex, rather long.

Posterior tibiæ clothed with long hair.

Sp. 1. *Alis cinereis, strigis numerosis abbreviatis nigris, anticis strigâ transversâ juxta basin alterâque lunatâ ad apicem distinctioribus nigris.* Habitat St. John's Bluff, E. F.

Wings cinereous, all with numerous, abbreviated, black strigæ. Anterior with a broader, transverse striga near the base, a black lunule at the apex, commencing on the costal margin near the apex, and terminating on the posterior margin at about an equal distance from the apex, and two more distinct, abbreviated, black strigæ near the anal angle. Thorax cinereous, varied with black. Abdomen cinereous.

Differs from *Cossus* in the bipectinate antennæ. In form, texture of the wings, and coloring, it is closely allied to that genus. Probably it is an internal feeder. The neuration also of the anterior wings is different.

[Dr. Harris adds to this the following note:—♂. Antennæ doubly pectinated to the tip. Wings gray, semi-diaphanous, fuscous at base; first pair rounded at tip, with a narrow, transverse, black band near the base, and a semi-circular one at the tip; both pairs with dusky, reticulated lines.]

The *Hepialidæ* seem to have but few characters in common. The larvæ, it is true, are allied in habit and form, especially those of *Zeuzera* and *Cossus*.

In *Zeuzera*, *Cossus*, No. 104 and *Hepialus* (all the genera that come under this group), the absence of the tongue is all that in the perfect state binds them together.

Zeuzera has semi-diaphanous wings, both nearly similar in neuration. The ♂ have rather short antennæ, with long pectinations about one half their length. In the ♀ they are simple but woolly at the base. They have no tongue, and apparently no palpi. The larva is an internal feeder.

Cossus has the wings more thickly clothed with scales, especially below; the neuration is very different and rather complicated. The antennæ are pectinate, or rather have on the inner side of each joint a broad, flat, or lamelliform process. The palpi, two in number, are distinct, triarticulate, rather stout. Tongue wanting.

My 104 is a *Cossus*, with bipectinate antennæ, and some difference in the neuration of

There is a true *Cossus* with mottled upper wings, and yellow under wings, black at the base and inner margin,—*Robiniæ*, ♂? Here is also a large moth (ex. alar. 4 in.) apparently allied to *Cossus*, which I do not at all know; its wings are more pointed. The anterior are white, mottled or clouded with fuscous, which forms almost a transverse bar near the middle, and a darker cloud or two near the outer margin. Cilia dirty white, with fuscous dots. Posterior wings pale fuscous. Cilia as in anterior wings. Body pale fuscous, the incisure of the abdomen darker. Antennæ setaceous, ♀?

You will see above, outlines of two or three larvæ. [They are figured by Doubleday in Newman's Entomologist, and described on p. 55, etc.] You will observe that the first, 60 [*Heterocampa Astarte* Doubl.], is very unlike *Stauropus*, and must necessarily lead to the formation of a new genus. Stephens thinks so. I would suggest the name *Balia* (βαλιὸς,) *maculosus*, *velox* [*Heterocampa* Doubleday, Entomologist, p. 55]. In *Stauropus* the anal tuft of the male is larger, and the antennæ of ♂ more pectinated; also the abdomen of the ♀ is tufted, in this not. The two next larvæ are of my 56. The upper appears to be the full grown larva, from which it would appear that the young have the anal prolegs fit for use. These both belong to the same genus. You will add to the description of 56 and 60 the following of the larvæ:—

60. Larva green, dotted all over with dusky spots. Back

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the wing, especially near the anal angle. The palpi nearly similar to *Cossus*, but less hairy.

Hepialus differs in the neuration of the wings, and also in their texture. The short moniliform antennæ of all our species, save one, easily distinguish it. Palpi and maxillæ none. *H. sylvinus* has short, pectinated antennæ, and probably ought to be a distinct genus. In habit it differs materially from *Cossus* and *Zeuzera*. Both the latter have internal feeding larvæ, and sit generally on the trees on which the larvæ have fed. *Hepialus* has a subterranean larva eating the roots of vegetables. The perfect insects fly low over the grass, often making a segment of a circle in their flight. The motion of *Hepialus hectus*, ♂, is exactly that of the ball of a pendulum. They fly early, sometimes as soon as sunset. They sleep on the blades of grass, or on the shoots of brushwood.

yellow green, this color bounded on each side by a red curved line; two short red lines on the back of the seventh and ninth segments. A longitudinal yellow line extends from the last thoracic segment to the tail, margined except in the three last, with a close continuous series of red dots. Anal prolegs useless as organs of motion, forming in appearance a short bifurcate tail. Pupa smooth, black, "feeds on the *Quercus lyrata?*"

56. Larva, when not full grown (?), green, with scattered white spots, head pale flesh color; back of the three thoracic segments the same; a small patch near the base of the third pair of legs, an irregular mark on the third, fourth and fifth abdominal segments, a patch over the fourth pair of prolegs and a small square spot on the twelfth segment, as well as all the prolegs, pale flesh color. Legs ringed pink and white, two small horns tipped with black close behind the head. Anal prolegs perfect. Adult larva of a buff color, with numerous subocellate whitish spots, and a large lilac patch on the back of the three middle segments extending laterally forward nearly to the head and tail. A similarly colored patch near the base of the third pair of legs. Anal prolegs not perfect. Pupa smooth, dark brown. [Further notes upon these insects, taken from Doubleday's MSS., are given in a note.[1]]

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[1] Genus *Stauropus?* [*Heterocampa* Doubleday, Entomologist, p. 55.]

Palpi short, porrect, biarticulate, first joints cylindrical, curved. Second joint nearly double the length of the first, slightly curved at the base, slightly stoutest in the middle, tapering towards the apex, both densely pilose and setose.

Antennæ of the ♂ strongly bipectinate for about two thirds of their length, the pectinations fringed with delicate setæ; apex simple. Antennæ of ♀ simple.

Maxillæ but slightly developed.

Head densely clothed, a fascicle of hair-like scales at the base of each antenna very distinct in the ♂ (less so in the ♀).

Thorax densely clothed, slightly crested behind.

Abdomen tapering, rather long, slightly tufted in the ♂.

Wings entire.

When I wrote out the character of this genus above, I imagined it quite distinct from *Stauropus*. I then had only a ♀ *Stauropus*, but having since got a ♂, I find that the male differs from 60, 57 and 56, only in having the pectinations of the antennæ more lengthened, and the abdomen rather more tufted. Of these three species I have only ♂. Had I a ♀, it would much aid me, as the ♀ of *Stauropus* has the tail much tufted. The knowledge of the larva, too, is essential. The larva of *Stauropus* is

There is also a beautiful and large specimen allied to *P. concinna.* From the larva of that curious thing, *torrefacta* Sm.-

so peculiar as to decide the question at once. Kirby's plate is tolerably good, but too stout. The larva is much slenderer, of a chestnut color, appearing exactly as though it was French-polished, or rather dipped in oil. The pupa is not enclosed in a close cocoon as represented in Donovan's wretched plate, but in three or four leaves loosely spun together.

Sp. 1. *Menas* (60) (*Μηνὰς*, Luna). [*Heterocampa Astarte* Doubl.] St. John's Bluff, E. F., rare. Mar. and Apr. *Alis anticis viridi-cinereo ferrugineoque variis, maculâ juxta apicem lunatâ albâ ferrugineo marginata.*

Sp. 2. *Athereo* (56). (Name of an Indian chief who welcomed the French Huguenots to the banks of the St. John's, E. F., then the San Mateo; vide Cardenas.) St. John's Bluff, E. F., rare. March and April. *Alis anticis olivaceo-virescentibus, atomis paucis-obscurioribus albidis nigrisque variis. Strigis duâbus transversis comminentibus, quorum una e lunulis altera e punctis subtrigonis nigris.*

Sp. 3. *Manteo* (57). (Name of Indian Chief.) [Not *Lochmæus Manteo* Doubl., Entom., p. 58. The name of *Manteo* was afterwards applied by Doubleday to No. 813, below; this may be called *Heterocampa Doubledayi.*] St. John's Bluff, E. F. April; one specimen only.

Alis anticis fusco-cinereis, ferrugineo tinctis, strigâ juxta apicem punctorum fuscorum.

[Dr. Harris adds to this the following note:—Grisled with brownish black (or dusky reddish); fore wings with a short obsolete fascia before the tip, and a row of blackish spots near the margin; hind wings paler, but dusky, with a darker, transverse band; an obsolete band at base of fore wings.]

Closely allied to the above three species is my 319. Of this I have only males taken at Trenton Falls in July, 1839, and by Mr. Moore in July, 1838. It is not very uncommon there, though I have but few good specimens. I believe I gave you specimens when at Cambridge.

Next to these come my 813, 815. [813=*Lochmæus Manteo* Doubl. 815=*Cecrita? bilineata* Pack.] They have the maxillæ more developed, and differ also in the structure of the antennæ. But if I am right as to these, the ♀ (and of 815 I have only ♀), differ very much from *Stauropus* in the abdomen, being short and simple instead of long and tufted. Probably these ought to constitute a new genus.

[Dr. Harris remarks of 813:—Abbott's figure, No. 330, may possibly be the same as this species. Antennæ of ♀ simple; of ♂ long, bipectinated not quite to tip, pectinations narrow. The markings vary, and it is difficult to represent them even by figures. The ♀ has kidney spot white with two black dots in it; in the ♂ it is smaller, with one large black spot. A dusky hour-glass shaped band follows the kidney spot, and is terminated externally by double zigzag blackish lines, the outer one of which is interrupted with black dots; the description of *Lochmæus Manteo* applies best to this.]

814 is so imperfect I know not that anything can be said with certainty about it. It differs very much in many respects from 813 and 815.

[Dr. Harris remarks of 814:—Wings brownish white; body dusky, fore wing with a dusky band near the base, continued on the inner edge; two distant dusky spots near the tip and irregular dusky streaks and crescents between. Hind wings dusky, with an irregular, nearly obsolete, whitish band; blackish on the hind edge. ♀ larger; middle of fore wings almost white and without streaks or spots between the band and the spots near the angles.]

Abb., it seems to me to belong to the same group as *Demas*, —at any rate to the *Artisiæ*. *Scribonia* certainly belongs to them, and in its own group symbolizes *Zeuzera*. *Dryocampa* must belong not to the *Bombycidæ*, but to the *Notodontidæ*.

You will see on the other side a larva, larva case, pupa and imago, of an insect allied to, but distinct from, *Thyridopteryx* Steph. The imago is chocolate brown, disk and nervures darker, a trilobate white spot on the upper wing. Feeds on a shrub, I think the *Mespilus æstivalis* Walt.; vide Elliott I, 549. It is figured by Abbot.

I must say one or two things more. The larva of *Lophocampa* proves to me that it is allied to *Acontia*, *Erebus*, etc., and comes late in the *Noctuæ*. It is a half looper with twelve feet. Abbot has figured, or rather drawn, a species I do not know, small and differently colored. Larva purplish, with orange and yellow spots, feeding on *Hibiscus Moscheutos*.

There is one more insect I will mention, and then I have done. It is a *Colias*, very near to, but smaller than our *Edusa*. Upper wings deep orange, with a broad black border, in which is one small, round, pale yellow spot near the lower angle. The central black dot as usual. Under wing grayish, clouded externally, with an incomplete blackish margin, and a bright central orange spot. Below, upper wings yellowish, disk orange, one central and four marginal black dots; lower wings greenish, with a central white spot surrounded by a pale ring.

HARRIS TO DOUBLEDAY.

CAMBRIDGE, Sept. 15, 1839.

The male *Oiketicus* has the form, etc., of a *Zeuzera*; the larva, in form, is not remote from those of the *Zeuzeriadæ*; and it has the habits of the true spinners, or *Bombyciadæ*. From the latter we pass by means of *Megasoma* Boisd., to the *Atta*-

cidæ. *Attacus luna* and *Polyphemus*, notwithstanding the difference in their hind wings, cannot be separated generically, for their larvæ [Pl. IV, figs. 14, 17] and cocoons are almost exactly alike. These two will form one section of the genus, while *Cecropia* and *Promethea* constitute another. *Bombyx Io* is much nearer to *Saturnia* than is *Proserpina*, inasmuch as the joints of the antennæ are each doubly bipectinated. In *Aglia tau* each joint seems to have only one branch on each side; but there are, in fact, two branches which are so close together as to appear like one. In our *Proserpina* I cannot find that the apparently single branches are in reality bifid; nevertheless *Proserpina* comes nearer to *Aglia* than to *Saturnia.* Perhaps *Io* and *Proserpina* should be types of new genera. *Endromis versicolor*, in the perfect state, is evidently very near to our *Proserpina*; but is, with great propriety, made the type of a distinct genus, on account of the form and habit of the larva. It approximates very remotely to *Bombyx mori*, to use an Irishism. The *Ceratocampiadæ* cannot come among the *Notodontiadæ* (although like some of the latter, *e. g.*,*Pygæra*, they are not true spinners), because the hind wings of the former are reversed in repose, in which they exactly agree with *B. Io*; while the hind wings in the *Notodontiadæ* are never reversed. The cocoon of *B. Io* is very slight, consisting only of a little gummy matter, with which a few leaves are fastened together and lined. *B. Proserpina* is said by Abbot to transform in the ground without making a cocoon; both of them are gregarious, at least while young. The *Ceratocampiadæ* are gregarious also, and transform in the earth without making cocoons. In this respect, too, they agree with *Pygæra* and the larva of *Dryocampa senatoria.* Beginning the *Notodontiadæ* with *Pygæra*, I leave it with *Limacodes*, which certainly ought to come in this family, rather than among the *Arctiæ.* The cocoons are egg-shaped, and very hard, as those of *Cerura.* Without doubt, that very curious and beautiful moth, the *B. torrefacta* of Smith-Abbot, should come among the *Liparidæ.* It is the

Dasychira? Firmiana of my catalogue, but not a true *Dasychira*; and, as its changes in form and color in the larva state, are very great and remarkable, I have called it *Astasia*, which expresses its changeableness. At an early stage it has much the appearance of the larva of *B. opercularis*, which, with the *pyxidifera*, belongs to my new genus *Lagoa* (from λαγῶος, *leporinus*), having a short and soft-haired body, like a rabbit or hare. The genera *Lophocampa* and *Euchætes* were formed by me long ago, and I believe that I pointed out their peculiarities and explained their etymologies when you were here. They certainly belong to the *Liparidæ*, on the border of the *Arctiadæ*, to which they closely approximate. Upon the latter I have nothing to say, except that I wish that the larva of Boisduval's *Callimorpha? Lecontei* were known, which would settle the genus, and its place. *Nudaria*, as it appears to me, is very properly placed among the *Lithosiadæ* by Boisduval; and after leaving the family I think we ought to enter the *Noctuæ* by *Apatela*, and the genera similar to it, which Boisduval includes among his *Bombycoides.*

I believe that I showed you a set of drawings of the nervures of Lepidoptera which I made twenty years ago. They contain most of the genera of our butterflies, about twenty *Bombyces* belonging to the nine families of my sketch in this letter, and some *Geometræ.* These drawings have materially assisted me in locating the families and genera, and given me additional confidence in the arrangement which I have proposed. I have also gathered some valuable hints in regard to the details from Dennis and Schiffermüller's Wiener Verzeichniss, and from Boisduval's Icones des Lépidoptères nouveaux d'Europe. Boisduval really appears to me to be the most philosophical and best instructed of our modern Lepidopterists, and I only regret that he has not given his views more extensively, and applied them to Extra-European moths.

I have compared my *Psychomorpha epimenis* with the specimens of *Brephos parthenias* and *notha*, which you sent to me;

and am convinced that you and Westwood are correct in approximating it to these insects. Whether it be strictly congenerical with them can only be ascertained to a certainty by comparing the larvæ, when that of *Epimenis* shall be discovered. The larva of *Eudryas grata* (*Cyphocampa grata* mî, from κυφὸς, *incurvus*) were abundant on my grape-vines during the summer of 1836, and I obtained several fine moths from larvæ which transformed in pots. They live solitary, and enter the earth to change, without making a cocoon. The position of the larva in repose, with its head depressed, and the third and fourth segments arched upwards, giving it a hunch-backed appearance, suggested the name of *Cyphocampa*; which, however, must now yield to that of *Eudryas*, proposed by Boisduval. The attitude, disposition of the colors, and even the habitat, being similar to those of the larva of *Alypia octomaculata* (see Smith-Abbot for the latter) probably led Boisduval to place *Eudryas* among the *Sphinges adscitæ*, in his Histoire Naturelle des Lépidoptères. The simple setaceous antennæ, and the double stigmas on the wings of *Eudryas*, forbid our associating it with these *Sphinges*. The larva of *E. grata* exhibits no irregularity in its gait, but creeps with a uniform even motion, its legs being sixteen in number, and the prolegs all of an equal length ; so that in this respect it does not approach any of the half-looping *Noctuæ*, although it may possibly find a place near them if it does not belong to the *Notodontiadæ*, where, at present, I am disposed to leave it, as in my catalogue. The wings of the moth in repose are like those of *Orgyia*. The palpi are horizontal, not at all compressed, and the joints are nearly cylindrical, which also remove this insect from the *Noctuæ*.

Westwood's name recalls to my mind some facts stated in his useful "Introduction," which, as I can confirm them, I will now mention, lest they should again escape my recollection. On page 68, Mr. Westwood says that "Lequien's figure of the larva of *Anthia sexguttata* does not belong to the *Carabidæ*, and that it approaches much nearer to the larvæ of the *Elate-*

ridæ." I was struck by the absurdity of calling this the larva of *Anthia* the moment I saw Lequien's figure in Guérin's Magazine, for it is as near as possible to the larva of *Elater oculatus*, which I have had in keeping, and from which I have raised the perfect insect. Moreover, I made, some years ago, a very exact outline drawing of this larva of *E. oculatus*, [Pl. IV, figs. 1–3], which, on comparison with Lequien's figure, confirms my first impressions. On page 156, Mr. Westwood says that "Mr. Brullé has very recently noticed the existence of a single minute tubercle upon the forehead of some of the *Dermestidæ*, which has all the appearance of an ocellus. Mr. Curtis had, however, discovered its existence in the genera *Megatoma* and *Attagenus* in 1829." Now, in the year 1831, I did not know anything of Mr. Curtis's discoveries, but, for some time previous, had noticed the same thing; and in the copy of a letter (I always keep copies of my letters) to Dr. McMurtrie, dated July 19, 1831, I find the fact thus recorded: "The existence of stemmata" (ocelli are thus named by Linnæus) "among Coleoptera has, I believe, been considered as confined to the genus *Omalium* and its affinities. On closely examining some species of *Anthrenus*, I detected a large conspicuous stemma in the middle of the front, and found that it existed in all the American and European insects of that genus in my cabinet, and also was found in *Attagenus pellio*, though it is not so distinct as in some *Anthreni*; but not in *Dermestes* and *Byrrhus*. Why some of these insects should have these little eyes, and others should be destitute of them, I cannot divine, particularly as their habits are so closely alike."

The more I think of the *Bombyces*, etc., so much the more am I dissatisfied with a linear arrangment of them. May they not be resolved into two series? 1. *Bombyces veræ*,—to contain the *Attacidæ*, *Bombyciadæ*, *Lipariadæ*, *Arctiadæ* and *Lithosiadæ*. 2. *Pseudo-Bombyces*,—to contain the *Ceratocampiadæ*, *Zeuzeriadæ*, *Psychiadæ*, *Notodontiadæ*, and perhaps the *Apateliadæ*. The characters of the *Bombyces veræ*, as derived from the larvæ, would be:—spinners, transforming in silken cocoons; body generally hairy, sometimes smooth, mostly tuberculated, the hairs arising from the tubercles, and disposed in stellated clusters or tufts. Antennæ of the winged insect, for the most part, fully pectinated on both sides, at least in the males. *Pseudo-Bombyces*:—imperfect spinners, transforming generally in cocoons formed of a gummy matter, which becomes more or less membranous or paper-like, sometimes changing without making a cocoon; body mostly naked, or sparingly hairy, sometimes tuberculated, the tubercles not setiferous, and the hairs (when there are any) arising immediately from the skin, and not from tubercles. Antennæ of the perfect insect seldom fully pectinated to the tip in the males, often simple in the females. Other characters may be added, but it is difficult to generalize in this way, for the exceptions will always multiply in the formation of large groups. You will not suppose that I think these two series should follow each other, but rather that they are parallel, and both begin and end at the same point, running together or coalescing at their extremities.

None of the *Sphinges* described in your letter are known to me. One of the larvæ sketched in your letter is named "*Ps. epiminis*" by you. From its form I should have supposed it to be rather my *Cyphocampa*. Is there not some mistake about the name?

DOUBLEDAY TO HARRIS.

[Without date; received March 9, 1840.]

I am going to start two difficulties; the first, the transit from *Psyche* to *Bombyx*; the second, as to the place of *Limacodes*. I must freely confess that I cannot find any better location for them, yet I cannot quite reconcile myself to their present station. In regard to the *Psychidæ*, I must also tell you that the insect of which I found the larva-case, is identical with Stephens' *T. ephemeræformis*. Mr. Gosse, who has been staying some years in Canada, and is going to bring out a book to be called the "Canadian Naturalist," spent the summer of '38 in Alabama. He found there plenty of the cocoons, or rather larva-cases, of this insect. All of his specimens were spoiled, but he has a most beautiful drawing of the insect, both ♂ and ♀, the latter about four tenths of an inch long and one tenth broad. He is going to publish his account of it very soon. My specimen is bad, and therefore cannot fairly be compared with his drawings, but I have some suspicions that it is distinct. He states that his is always found on *Pyrus*, *Cratægus*, *Aromia*, or some such genus of shrubs, whilst I always found the cases of mine on *Cupressus thyoides*, a species of *Ambrosia*, and one or two aromatic plants. In a small box sent from our new colony of South Australia to the Club Cabinet, is another species of this genus (?) or group (?), but I have not yet examined it. It has a very hairy body and quite clear wings, the nervures of which struck me as very singular. I will perhaps examine it before I send off this letter. Perhaps Stephens' genus ought to be sunk. I shall look at Horsfield's Javanese collection when next in town; he has some species of this group. I must confess I see some resemblance between the males of *Thyridopteryx* and of *Bombyx mori*, yet the larvæ are very different.

I do not know much about *Limacodes*. Our English species seem to me very distinct from yours; in fact your *L. cippus* hardly seems to belong to the same genus. On reference to Donovan I see that his figure represents the larva of our *Limacodes testudo* as exactly like that of a *Thecla* (nearest to *T. niphon* Boisd.), but with the margin depressed. The pupa-case is like that of *L. pyxidifera*. The perfect insect flies swiftly over the underwood about noon, or an hour or two later. I want to get *Heterogenea asellus* to compare with some specimens from North America which I have called *Limacodes*. I have ten species of *Limacodes*, or closely allied genera, but think some nearer to *Heterogenea*.

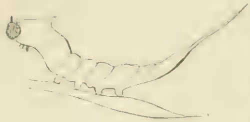

Fig. 21.

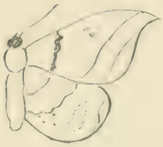

Fig. 22.

Where do you place *Platypteryx*? The larvæ of our different genera of the *Platypterycidæ* Steph. vary a good deal. One is like *Cerura*, but slenderer; another is short and thick, like a *Limacodes*, or like Abbot's drawing of the larva of my 261. They surely come amongst the *Bombyces*. In Abbot's drawing is a species of which I have sketched the larva and half the female. The perfect insect is rose-colored, excepting the band from the apex of the anterior wings and the posterior portion of the hinder. There is a dark striga across the base of the two wings, and two sub-ocellated spots in the disk of the anterior ones. Also a few red dots in the yellow of the lower wings.

I look with anxiety for your paper on the *Bombyces*. I have employed Raddon to engrave a plate of the larvæ of a few *Bombyces*, and the imago, etc., of Abbot's *Oiketicus*. The larva I sketched [in a previous letter] was from Abbot's drawing of *Phalæna epimenis*. In form it is just like our *Parthenias*, but rather stouter, and very different in color. *Parthenias* has the first pair of abdominal prolegs shortest and almost useless, and has a looping gait, but does not absolutely loop. Abbot's drawing of *Cyphocampa*, if his be a *Cyphocampa*, has but four abdominal legs. *Erebus*, too, has a half-looping larva, and, like *Brephos*, the first pair of abdominal legs short and apparently useless. Some of the *Catocalæ* have something of this structure. A sketch in your next of the larva of *Eudryas grata* would much please me, even if the eight legs are all quite perfect. I fancy it must go quite near to *Acontia* and *Euphasia* Steph., though it may be that this insect belongs to the *Notodontidæ*, and only in its coloring, etc., offers one of those striking instances, which often occur in very distinct groups, of identity, or nearly that, in markings and other unimportant characters. These are what MacLeay and Swainson call analogies. Abbot's insects must then be quite distinct, not only as to genera but as to families.

You speak of *Ceratocampa* as being gregarious. When in Florida, my excellent landlady, Mrs. Smith, told me that on Major Travers' plantation, now laid waste by the Indians, a large caterpillar with several horns on its head, used to strip the orange trees of their leaves, and that a great many of them lived together; was it the *C. regalis*? Of *Bombyx Proserpina* I have no specimen. I saw one in a pine wood near Columbia, S. C., and have lots of larvæ out of turpentine from Wilmington, N. C.; so I suppose it is common there. I forget whether I mentioned to you that I am convinced that Abbot's *torrefacta* and Cramer's *firmiana* are two quite distinct species.

I have been looking over Boisduval's Iconographie very carefully. His plates are poorly colored and not exact. Do you ever find what he calls *Edusa*? I have never seen an American one. I forget whether I told you that I found amongst Foster's specimens of *P. Ajax*, a species distinct from this and *Marcellus* Boisd. It has the red spot bilobed, but is nearest to *Marcellus* Boisd. Boisduval's reference to Drury under *Sinon* is wrong. I have Drury's *Protesilaus* from Jamaica; it is a species not in his General History of the Lepidoptera (Suites à Buffon), and he evidently has not seen it; Drury's plate is as correct as possible. Do you know any instance of *Rhodocera merula* being captured in the United States? As to *Thecla*, are not his *hyperici* and *Falacer*, Drury's *Acis* and *Pan*? Again, his *smilacis* is Cramer's *Damon*. Next, in *Polyommatus*, his *Epixanthe* is only a variety of *P. Phlæas*, as he calls yours; but yours is distinct from ours. You gave me his *Epixanthe*; I have seen varieties of our *Phlæas* just like it; our *Phlæas* is more tailed. Mr. Gosse has some lovely *Polyommati* in his drawings. One from

Newfoundland, nearly one half an inch in expanse, purple margined and glossed with purple on the coppery disk, like *chryseis*, but more beautiful. He also has two blues, one very near to our *Argus* (from Newfoundland, as the others).

Do you know any authority for *Aganisthos Orion* being found in the States? Gosse has a drawing of an *Hipparchia* like *Alope*, but having only one ocellus in the fulvous spot, and differing in one or two other trivial points. This is from Alabama, and probably *Pegala* Fabr.

You ask about Abbot's drawings. There are one hundred and forty-nine of Lepidoptera, of which most have larvæ, some have no larvæ, and on these sheets there are usually two or three species. At least one half I do not know. I have the *Noctuæ* and *Geometræ* by me. There are twenty-eight of the former with larvæ, none I think published, and of the latter sixteen, none published. Raddon asks fifty pounds for these and about forty plates of Coleoptera. I doubt whether nearly one half are published. They are far more beautifully finished than any other of Abbot's I have seen. The size is fourteen by ten inches.

HARRIS TO DOUBLEDAY.

May, 1840.

That *Limacodes* must come somewhere near to *Cerura*, does not seem to me to admit of a single doubt, and *Cerura* seems rightly placed in the *Notodontiadæ*; but what are the genera connecting *Limacodes* with the *Liparidæ*? I do not know at present. The woolly bodies, and the antennæ of some of the latter, seem to me to justify placing *Limacodes* near to them; and I have one moth, apparently a *Limacodes*, or very near to it, which has the fore legs woolly, and porrected like *Orgyia*, etc., but I cannot doubt that they are approximate forms.

Platypteryx is too slender-bodied to go with the *Bombyces*;

I think it ought to be placed near the *Geometridæ*. Boisduval's American (?) *Colias Edusa* is not found here.

DOUBLEDAY TO HARRIS.

EPPING, May 27, 1840.

I have cursorily examined Abbot's drawings in the British Museum. They are in seventeen large, thick, quarto volumes. Of these, three are Lepidoptera without larvæ, two with larvæ, etc. They contain, too, a vast number of Abbot's manuscripts. These five volumes I have examined. I may mention a few things. *Melitæa Ismeria* larva. "Feeds on crosswort. Frequents the oak woods of Burke County, but is not common. Caterpillar suspended itself May 16th, changed to chrysalid May 17th. Butterfly appeared May 26th." Do you know this species? The name I think is Boisduval's. The drawing has no name to it. *Polyommatus Tarquinius.* "Larva on arrow-wood and alder. Frequents swamps, but rare; most common in Big Ogeechee Swamp. Larva suspended itself on the 12th of April; became a chrysalis on the 14th. Butterfly appeared Apr. 25th." There is a species of *Pygæra* closely allied to, but yet distinct from, what I have called *ministra*; this is also figured with a different larva. Probably mine (taken at Trenton Falls) is the more Northern species. Of the genus *Limacodes* there are some most interesting species quite new to me. A few I have of Abbot's own collecting. The *Oiketicus* I am now engraving from Raddon's drawings, and have its history at length. I shall print this as soon as the plate is ready. I observe a drawing of *C. Philodice*, but he mentions that it is very rare. I did not know it occurred so far south in the low grounds. There is a large and beautiful *Polyommatus* allied apparently to our European species, *P. Acis* W. V., *Pap. Cymon* of Lewin. *P. Protodice* and *A. Genutia* are drawn also without larvæ. The former marked very rare; the latter "oak woods near Savannah, rare." I hope before long to examine these books very fully, and will report more at length. At any rate, they are a treasure. They were originally Francillon's, and were purchased by the British Museum. They have also in the Museum many Lepidoptera of Abbot's collecting, some recently purchased at Milne's sale.

Newman has just had a box of insects from the Cape of Good Hope, in which is a *Cetonia*, closely allied to your *C. brunnea* Dej. Now is not this African species the true *Indus*, and your American one a distinct species? I think there can be no doubt that yours is not the *Indus* of Linn. and Fabr., although I am well aware of the little dependence to be placed on the habitats given by either. India means, I judge, anywhere out of Europe.

I told you that *Argynnis Cybele* and *Aphrodite* were two species. I know the two, but cannot make out Kirby's description.

I have another thing to tell you; I have been mistaken about your *Sesiæ*. I have not *Sesia diffinis* of Boisduval. I had not looked at his figure, and concluded that a specimen I took at Trenton Falls was it, but find it quite distinct. Abbot has drawn all. The one I have is smaller than *Pelasgus*, but more like that than *diffinis*. I think it is not Kirby's *ruficaudis*. On going over the British Museum *Noctuidæ*, I have been struck with the large numbers that have crept into our English catalogues. Amongst these are *Graphiphora subrosca* Steph., *Hadena amica* Steph. (not of Ochs.), one or two *Plusiæ*, *Euphasia catæna* Steph., *Scolopus Inops* Steph., *Acontia nigrirena* Steph., *Ophiusa grandirena* Steph., etc. Most of these I have. A few, as the beautiful *Euphasia catæna* (*Acontia catæna* Curt.), I have not. There are two specimens of this in the British Museum, from Abbot. It is something like *Eudryas unio*,—white, anterior wings with two olivaceous marginal spots and a discoidal one, with a broad lilac border, in which, near the margin, are several sub-ocellated white spots; posterior wings whitish, with a slightly brown margin. In all old collections are many specimens collected by Abbot; at Francillon's, Donovan's and other sales, some of these have been dispersed, and have crept into collections nominally British only. At Milne's sale, a large number of Abbot's insects were bought by the British Museum. The large *Sphinx* I mentioned in Abbot's drawing, of which one was sold at his sale, is *Labruscæ*. You have thus, *Brontes*, *Labruscæ*, *quinquemaculatus* and *Chionanthi*, with at least two other large *Sphingidæ* to add to your list. Kirby's *Smerinthus Cerisyi* is only a variety of *S. geminatus*, I imagine.

HARRIS TO DOUBLEDAY.

CAMBRIDGE, Aug. 31, 1840.

Eudryas grata changes to pupa in the earth without forming a cocoon; the pupa is quite different from that of any other moth known to me; it approaches, however, somewhat to that of *Dryocampa*, being very dark colored and rough, or granulated, and almost serro-dentate around the edge of the ventral segments.

This summer I have made the interesting discovery of the larva of *Papilio Philenor* in Massachusetts, having found them just hatched on the *Aristolochia sipho* in the Botanical Garden, on the 5th of this month (August). *Philenor* has never, to my knowledge, been observed before in the New England States, though it is common in New Jersey, near New York City. *Aristolochia sipho* grows wild in the woods about New Haven, which is the nearest locality to Cambridge of this genus of plants. It is possible that *Philenor* may be found there, and from thence an impregnated female may have migrated, or may have been carried by the winds to this place. In the Middle and Southern States *Philenor* inhabits *Aristolochia serpentaria*. The young larvæ of *Philenor*, before the first moulting, closely resemble in form and in their tubercles, the figures of the larva of *Ornithoptera Helicaon* in Boisduval's Histoire Naturelle des Lépidoptères, taken from Dr. Horsfield's catalogue. After the first moulting, the first pair of tubercles increase in length, and become proportionally much longer than the others, and the body itself becomes more elongated. Abbot's figure of the full grown larva may be considered as quite correct, except that the last pair of dorsal tubercles should have been curved backwards and outwards, and the yellowish, or rather orange-colored spot on the first segment, should have been placed between the first pair of horn-like tubercles immediately in contact with the head, and not behind them. The pupa is not well done in Abbot's work, and both larva and pupa in Boisduval and LeConte's Lépidoptères de l'Amérique are miserably represented. The pupa approaches more nearly in form to that of *Ornithoptera Helicaon* than it does to that of any other butterfly known to me. It appears to me that *Philenor* may be considered as one of the connecting species between *Ornithoptera* and *Papilio*; while *Podalirius*, *Asterias*, etc., come at the end of the latter genus, connecting it with *Doritis*, *Colias*, etc. The larvæ of *Philenor* live in company, cover the surface on which they are about to move with zigzag lines of silk, and seem unable to crawl or hold on without this precaution; for when placed on a fresh leaf the least motion causes them to fall off. This is not the case with the larvæ of *Asterias*, which is solitary; but those of *Turnus* and *Troilus*, also solitary, cover the leaves on which they live with a complete coating of silk, and bend up the sides of the leaf to form a sort of trough, in which they remain when at rest. Hence the three groups of which these species are the representatives, differ from each other as much in habits as in the form of the larvæ.

DOUBLEDAY TO HARRIS.

EPPING, Sept. 11, 1840.

Westwood has been dissecting *Eudryas*, and sees an affinity with *Deiopeia* and *Hypercompa*. Stephens thinks it near to *Acontia*. "What's to be done when doctors disagree." The larva of your *militaris*, or any allied species, is not in Abbot's drawing. Stephens thinks it a true *Hypercompa*. The habits of this and the Southern species, as well as *Lecontei*, are just the same as those of our *dominula*. The last is a much gayer insect. Stephens says your *militaris* is quite distinct from *Lecontei*, and points out a small white spot near the outer margin, as not being present in *Lecontei*. I must acknowledge that I begin to waver in my opinion. He thinks the spots cannot coalesce so as to give the markings of *militaris*.

HARRIS TO DOUBLEDAY.

CAMBRIDGE, Sept. 27, 1840.

As I was accidentally turning over the fourth volume of Audubon's Birds of America, a little while ago, I saw on plate 359 a figure of your *Hera chrysocarena*, together with another moth marked exactly like it, but of a rich ochre or Indian yellow color, and which I suspect is the other sex. Audubon was here at the time, and I asked him about these insects. He told me that he received them from Nuttall; and that those on plate 359, which we reëxamined together, were taken by Nuttall near or among the Rocky Mountains. Audubon further said that as soon as he had drawn and colored them he gave the original specimens to Mr. Bachman. From the latter gentleman it seems that you received yours, and thus you get its true locality. Upon very carefully comparing it with *Saturnia Maia* (*Proserpina* Fabr.), and also with *Aglia tau*, I feel almost entirely convinced that it is congeneric with the former; that is, unless we subdivide the genus *Saturnia* very much, and even in this case it could not be very remote from *Maia.*

Do you remember the moth which you sent me for examination, numbered 266 [*Perophora Melsheimeri*], and respecting which these remarks occur in your manuscript? "266 I took in July at the Warm Springs. It seems allied to *Dryocampa*, but distinct; it will come under no English genus." Your specimen is a ♀. We have a much larger one, ♂, in our Society's collection; and Dr. Melsheimer has recently sent me a pair, with a cocoon.

The moth is light reddish ash-colored, or very pale fawn, finely sprinkled over with minute black dots; a narrow dusky band with an angulated inflection on the anterior margin of the fore wing passes across both wings to the middle of the inner edge of the hind wings; there is also a minute blackish spot on the fore wings. The antennæ in the male are curved and bipectinated to the tip, but the pectinations are narrowed towards the tips. The palpi are very small and cylindrical; and the tongue is obsolete and invisible. In the form of the body and wings it closely resembles *Bombyx mori*, but the neuration is somewhat different.

A few days ago one of my pupils brought to me a living caterpillar contained in a cocoon, as he called it, which proved to be exactly like the remarkable cocoon sent by Melsheimer with the moths, and this recalled to my recollection a remark made by Dr. Melsheimer in one of his letters, that he had got what he supposed to be an *Oiketicus*. Although not an *Oiketicus*, it is a true *Sackträger*, as the Germans would call it, for it bears about with it the bag-like cocoon whenever it moves from place to place. In the margin is a sketch of the cocoon, with the caterpillar stretching itself out, as is its custom when looking around. [See Newman's Entomologist, p. 100.]

The cocoon (for such it really becomes eventually) is formed of two oblong oval pieces of a leaf, very firmly united at their edges, and forming an oblong ovate cavity, thinly lined with brownish silk ; there is also a circular opening at each end just large enough for the caterpillar to crawl out. The caterpillar has a black, very roughly punctured head, furnished on each side, just behind the five ocelli, with two flexible, slender, spatulate antennæ (?) which, however, seem to be without joints and incapable of motion. Are they not intended as compasses to measure the interior of its habitation ? It has also four palpi, two very minute, and not ordinarily visible ; the other two much longer, attached to the maxillæ, and apparently three-jointed. These palpi are moved with the utmost rapidity during the whole time that the insect's head is thrust forth from its cocoon. The first segment is black and corneous, the next, and the rest of the body, are reddish-brown, and finely granulated. The spiracles, though small, are very distinct and of a black color. The first six legs are corneous and conical, and about equal in size. The prolegs of the usual number (probably, for I could not see the terminal pair), are very short, retractile (?) with only the oval coronet of hooks visible. The hindmost extremity is obliquely truncated, as in *Scolytus*, the truncated portion circular, and forming a flat plate of a drab color, which exactly closes the hinder orifice of the cocoon when the insect is included within it. The caterpillar and its case were found on the oak, the leaves of which it eats. It eats mostly by night, when it wishes to be stationary ; to change its place it comes partly out and cuts the threads, and then stretching further out, lays hold of the leaf with its six fore legs, and suddenly shortening its body, brings up the cocoon with a jerk. In this way it goes along half an inch at a time. Internally the case is large enough to permit the caterpillar to turn around, so that it can come out at either end at pleasure, and if disturbed at the hinder end, it turns with great facility, and shows its head and jaws to the disturber. All my attempts to make the insect leave its case entirely have been in vain, for it clings by its hind prolegs to the interior with the greatest pertinacity; and I have been afraid of injuring it by using too much force. The cocoon sent to me by Dr. Melsheimer, from which all the moths accompanying it had escaped, contains the remains of the chrysalis; both ends were stopped by little flat lids of brownish silk of the thickness and firmness of cartridge paper; one of these lids remained fixed, the other had been pushed off by the moth, but was still attached by some threads. On the middle of the edges of the six dorsal segments, the chrysalid had a transverse row of little teeth, which could be shut down into corresponding cavities on the top of the contiguous segment, forming six pairs of nippers, which were undoubtedly intended to enable the chrysalis to advance in its cocoon, and to take a firm hold when pushing off the lid. The tail is blunt, with six minute points. The form of the caterpillar and the structure of its cocoon are very different from those of *Oiketicus* and *Psyche*, and the moths, both sexes of which are perfect and furnished with wings, and differ only in the narrower pectinations of the antennæ of the female, are not referable either to *Oiketicus* or *Psyche*. I therefore propose to call the genus *Saccophora*, and the species *Melsheimeri*. Will not this singular and interesting insect remove some of your difficulties respecting the transition from *Psyche* to *Bombyx*? It may be that it is allied to some of the *Notodontiadæ*; but I want several genera, such as *Stauropus*, *Ptilophora*, *Chaonia* and *Peridea*, to compare with it. [This letter was published by Doubleday, with figures, in Newman's Entomologist, pp. 99–101.]

HARRIS TO DOUBLEDAY.

CAMBRIDGE, Oct. 8, 1840.

You will recollect I suggested that the *Bombyces* may be resolved into two groups of equal value, true spinners, and imperfect spinners. At the head of each must stand the *Attaci* and the *Ceratocampiadæ*, and in the following order you will observe how one group represents another opposite to it.

BOMBYCES.			PSEUDO-BOMBYCES.	
5 Attacidæ	e. g., Attacus, etc.	=	Ceratocampa, etc.	6 Ceratocampiadæ.
4 Bombyciadæ	e. g., Megasoma	=	Zeuzera, etc.	7 Zeuzeriadæ.
3 Liparidæ	e. g., Orgyia	=	Psyche, etc.	8 Psychiadæ.
2 Arctiadæ	e. g., Spilosoma	=	Clostera, etc.	9 Notodontiadæ.
1 Lithosiadæ	. . . .	=	. . . .	

In the following order you will see how these lead from the *Sphinges.*

Sphinges veræ	6 Ceratocampiadæ. 7 Zeuzeriadæ	5 Attacidæ, 8 Psychiadæ,	9 Notodontiadæ	Acronycta, etc. Plusia, etc.
Sphinges adscitæ	2 Arctiadæ . . . . . . 1 Lithosiadæ.	3 Liparidæ, 4 Bombyciadæ		

Or thus: $\left.\begin{array}{l}\left\{\begin{array}{l}7\;.\;.\;.\;.\;.\;8\\6\;.\;.\;.\;.\;.\;5\end{array}\right.\\\left\{\begin{array}{l}1\;.\;.\;.\;.\;.\;4\\2\;.\;.\;.\;.\;.\;3\end{array}\right.\end{array}\right\}9$

Or thus: $\begin{array}{ccccc} & 7 & & 8 & \\ 6 & & & & 9 \\ & & 5 & & \\ 1 & & & & 4 \\ & 2 & & 3 & \end{array}$

Here the Ceratocampians represent the Sphingians, and the Zeuzerians the Ægerians; while the Arctians and Lithosians seem naturally to follow the Agaristians and Callimorphians. Between the Zeuzerians and Arctians there is no affinity; but there are analogous forms in each, as might be expected from their situation; e. g., *Zeuzera æsculi* and *Arctia scribonia.* So, too, there is no affinity between the *Psychiadæ* and the *Liparidæ*; but their forms are analogous, e. g., wingless and sluggish females in each, etc. Moreover, the antennæ of *Psyche graminella* and the venation of the wings are wonderfully like those of *Orgyia.*

It would be impossible for me, within the compass of a single letter, to repeat the various considerations which have confirmed me in this arrangement. Taking the families in a linear series, I have begun in my report with the Lithosians, as intimately connected with the abnormal Sphingians or Glaucopidians, and particularly with such genera as my *Lycomorpha*, a lichen-eating species, *Ctenucha*, which Kirby puts with the Lithosians, and *Procris*, which closely resembles some of the Lithosians in habit and general appearance. Mr. Westwood, you know, calls many of the insects *Callimorpha* which I refer to *Glaucopis*.

You tell me that Stephens thinks *Eudryas* is near to *Acontia*; you have stated your belief that it comes near to *Euphasia*, or to some allied genus, while Mr. Westwood, who has been dissecting it, sees an affinity with *Deiopeia* and *Hypercompa*, and you ask, "What's to be done when doctors disagree?" I have very carefully compared *Eudryas grata* with all the foreign and native moths in my collection, and have arrived at the conclusion that unless Boisduval is right in putting it near to *Agarista* and *Ægocera*, it must go among the Notodontians. I believe that Westwood is not so far out of the way in seeing an affinity in it with some of the Lithosians and Arctians. It is just that kind of affinity it ought to have if it belong to the great group of *Bombyces* rather than to the *Noctuæ*. The remarkable, dark, dilated or spatulate scales on the thorax of *Eudryas*, precisely resemble those in similar situations on *Bombyx velleda*, but I have not seen anything exactly like them in the *Noctuæ*. In its winged state it seems to exhibit a close affinity to *Clostera*, *Pygæra*, *Cerura*, and even to *Notodonta ziczac*, *dictæa*, etc. In the form of the wings, their position in repose, and in its woolly fore legs stretched out before the body when at rest, it strongly reminds us of some *Ceruræ*. Its collar (*patagium*) is narrower and not elevated, in which it differs from most *Noctuæ* and agrees with the slender-bodied *Arctiæ*. Its abdomen nearly cylindrical, not tapering or depressed behind (during life), and with three rows of black dots, is, in these respects, exactly like that of *Euchætes egle*. *Cerura? verbasci* of Europe and *Pygæra bucephala* have the rows of spots on the sides, which are not found in any *Noctua*, to my knowledge. I do not know whether any of your European *Notodontæ* have simple, setaceous antennæ in both sexes, but *Phragmatobia*, *Spilosoma Isabella* and *Hyphantria*, etc., have. The maxillæ of *Eudryas* are not much longer than the thorax, and the palpi are rather small and short. The eyes, especially in the males, are large, as in *Callimorpha*, etc.

The posture of the larva of *Eudryas* when at rest, is like that of some of the *Arctiæ*, e. g., *Euchætesegle*, and still more apparently like that of *Agarista*, which it resembles strikingly in form and coloring.

In looking over Stephens' catalogue, and also that of Mr. Curtis, some queries and doubts have occurred to me respecting the arrangement of certain genera in these works. Why are not *Gastropacha* and *Odonestis* placed immediately after *Saturnia*, rather than *Lasiocampa* and *Eriogaster*? Their larvæ are certainly more Sphinx-like, and therefore nearer to *Bombyx mori* than *Clisocampa*, etc. On the other hand why do not *Pæcilocampa populi* and *Cnethocampa* lead to the *Liparidæ* by their larvæ? Compare the caterpillar of *P. populi* with *Hypogymna dispar*, and of *C. pityocampa* with *Clidia geographica*, and see the close resemblance. These gentlemen seem to have mistaken the place of *Penthophera* and *Limacodes*. *P. morio* and *detrita* are clearly *Liparidæ*; the antennæ, venation of their wings, and general appearance indicate it, and, moreover, their caterpillars are described by Denis and Schiffermüller as having only six tubercles on each ring, whereas they have ten or more. If Mr. Stephens had known our American *Limacodes* (not all of them true *Limacodes*, but allied to it), he would not have hesitated to put this genus among the Notodontians, and near *Cerura*. By thus settling the place of *Limacodes*, we of course decide that of *Psyche*. *P. graminella*, ♂, the only foreign species in my collection, resembles *Limacodes cippus* closely in the venation and form of the wings; but I must also admit that in this respect it comes near to *Penthophera* and *Orgyia*. However this may be, if *Oiketicus* and *Psyche* stand together in one group, then this group must come between the *Zeuzeridæ* and *Limacodæ*, their naked larvæ and imperfect prolegs excluding them from the vicinity of the *Liparidæ*, and bringing them to the other side of the *Bombyces*. Have you observed how closely *Clostera* imitates *Acronycta* in the larva state, even to the little tubercles on the fourth and eleventh segments? Yet they are far removed from each other in Mr. Stephens' catalogue. It seems to me that the *Notodontæ* are resolvable into two groups (like almost all the other families of moths),—the type of one being *Clostera*, with a pilose larva, and of the other, *Notodonta* or *Cerura*, with a naked one. *Stauropus* in its antennæ, and *Cerura vinula* in the color and spots of the thorax, come nearest to *Zeuzera* and *Oiketicus*, while *Clostera* and *Pygæra* tend towards the *Acronyctæ* by their larvæ. I must confess, however, that I do not know enough of the *Notodontæ* to speak with great confidence about them, and only throw out these suggestions in order to see how they strike you.

DOUDLEDAY TO HARRIS.

EPPING, NOV. 16, 1840.

The *Saturnia* you allude to was given me by Dr. Bachman, who did not remember exactly how he got it, but believed it came from Charleston. It was in a box with a variety of Charleston insects, so I took it for granted it was found there. As to the name, you are at liberty, as in the case of all my insects, to name it as you please; I had given the matter but little thought when I wrote to you; and this reminds me that I have discovered various errors in my memoranda of the generic characters of the American *Notodontidæ*, of which I sent you a copy. You must take these characters with great caution till you hear farther from me. The history of the *Sackträger* is very interesting. It certainly connects the *Bombyces* and *Psyche*, especially by its habits. It cannot possibly be an *Oiketicus.* The only *Oiketicus* I have seen has the aspect of a *Psyche.*

The *Sphinx* I sent as *carolina* is considered by Stephens as the true *carolina* of Linn. Both species have occurred in England in or near nursery grounds. Probably the pupa had been brought over with earth around the roots of plants.

Three other American Sphinges have crept into our Cabinets. *S. cingulata* Drury, Donov., *S. plebeia* Fabr. and *S. pœcila* Steph. The last is, I believe, your *S. sordida.* Stephens says that the specimens which I named *sordida* from your paper are his *pœcila.* I had a great many specimens of what we here call *carolina* given me by Mr. Calverly of New York, and received about fifty of each species from Wilmington, Del., but mostly rubbed specimens. The person who sent them says he took them at the flowers of the poison-weed (*Datura?*).

My brother and I have consulted together about the larva and pupa of *Eudryas grata*, which came quite safely, and agree that it must be Notodontideous. I can hardly find time to follow you through all the details of your proposed arrangement of the Bombyces, but must make a few remarks on it.

Your beginning with the *Lithosiæ* appears to me the most natural plan, for certainly *Lycomorpha pholus* and *Ctenucha semidiaphana* lead to them by their structure. The lichen-eating habit of *L. pholus*, too, shows its affinity to the Lithosians. In June I found *Gnophria rubricollis* in profusion in a wood in Bedfordshire. I was struck with its resemblance to *C. semidiaphana* more than I had ever been before. It is not common here. My 263, which I doubt not is your *Gnophria vittata*, has a larva, according to Abbot, very like our *P. fuliginosa.* He has drawn it on a *Hieracium.* I think I mentioned to you that I have a *Callimorpha* near to *carolina*, but distinct, which was taken about five miles from Wilmington, Del. It is rather smaller, the anterior wings pale buff, or rather cream-colored, except just at the apex (the part

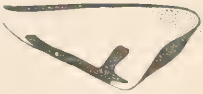
Fig. 23.

dotted), which is of the same ochreous hue as the under wings of this and *carolina.* The costa nearly to the apex, is brown-black, not extending below the subcostal nervure. The outer margin has a patch of the same color commencing below the apex and terminating at about an equal distance above the anal angle. The inner margin is rather broadly bordered with black-brown, which commences near the base, and terminates before reaching the anal angle, emitting a stout branch at its termination towards the middle of the wing and a much shorter one in the same direction as the band itself, but not touching the margin. The posterior wings ochraceous, immaculate. Below bright ochraceous (body and legs the same, except the anterior tibiæ and tarsi, which are black), immaculate, except a black, reniform spot, divided by a yellow nervure, which corresponds in situation to the inner branch of the marginal band. The spot on the outer margin and the costal line are not visible below. Thorax above whitish or pale buff; with a longitudinal line black ? (my specimen is rubbed here). Abdomen above ochraceous, with a black dorsal line. Do you know this ?

Scribonia puzzles me. In the imago it seems to be so unlike the *Arctiæ*, yet the larva is just an Arctian. You speak of three *Lophocampæ.* I do not know *maculata*, unless it be a species like *tessellaris*, but more distinctly marked, of which I have a specimen from Mexico. I have a specimen named *B. pyxidifera*, collected by Abbot. Where does this come ? I see by referring to one of your letters, it belongs to your *Lagoa*, with *opercularis*, which I have not. When at Cambridge I told you that I had a *Porthesia* from Trenton Falls. It is not a *Porthesia*, but seems to be a *Leucoma* or *Lælia.* It is about the size of *Spilosoma virginica*, body and all of a uniform, not very pure, white. The antennae are more deeply pectinated and I think longer. It closely resembles *Lælia cænosa*, a very rare species. I think I have never sent it to you. I have another broken specimen of it from Abbot's old specimens (originally sent to Francillon.) Of the genus *Orgyia*, I have three, if not four species: first, one close to our *antiqua*, which in fact might be mistaken for it; second, your No. 60, which varies a little in color; third, a species closely allied to your 60. but of a uniform or nearly uniform dark-brown; it is from East Florida, and very distinct from 60, though closely allied; the two others are from Trenton Falls. I have, too, a specimen taken at the latter place, much larger than your 60 (it expands fully $1\frac{1}{2}$ inches) and more highly colored, with a very plain white patch near the middle of the costa. I feel sure from comparing them again at the present time, that it is distinct. The under surface is quite different from that of your 60. I have not got Smith-Abbot's species; may not this be their *leucostigma?* Perhaps they may have given that name to your 60, from the small white spot at the inner angle. Besides these four I have a small species from East Florida, possibly an *Orgyia*. [60 Harr. MSS. Catal.=*Cladophora leucographa* Hübn.]

In regard to *torrefacta* do you know of two species in the United States? I think that I mentioned to you that in Abbot's drawings in the Museum, two closely allied species are represented, one I think the same as Cramer's figure (of this he gives the country as Surinam, I believe); the other I consider the same as a specimen I took in North Carolina, a less showy insect. The larvæ of these are very different. They may be tussocks, and I think now are not *Notodontidæ*.

I think *velleda* can hardly be a *Megasoma*, though I never saw that genus. It is a most curious insect. Of the *Clisiocampæ* I have only one species,—*mori*; I think as you do about it. I never saw its wings closed *en toit*.

Of the *Dryocampæ* I have only *rubicunda*, and the species you have now with my other Bombyces. I have no *Hepialus* from America. I think Gosse told me that one was common in Canada with metallic spots,—your species I suppose.

Have you compared the Georgian species I sent you of *Pygæra? gibbosa*, with the Northern one. Abbot seems to have been of the mind that there were two species of these; also of the true *Pygæra*,—one *ministra*, the other scarcely distinguishable from it at first. When next in the Museum, I will again look at his drawings. I hope to have a specimen of *Acontia solaris* for you when I send next. The resemblance between this and *Eudryas* is only an analogy. I mean analogy in the sense in which Swainson and MacLeay use it.

I think I told you that the specimens of *Argynnis* you sent me are the true *Cybele*. *Aphrodite* is smaller than the smallest *Cybele* I ever saw. Do you ever get *Troilus* near you? I have but very poor specimens. I have as yet but bad specimens of *P. Glaucus*, but hope for more this winter from Wilmington, Del. Wilcox told me it was found at New York. Do you take *Thecla Damon* Cr. = *Smilacis* Boisd.? I have only one which you gave me. I saw it plenty near Cumberland Gap, Tennessee, but could not then catch any.

DOUBLEDAY TO HARRIS.

EPPING, Feb. 27, 1841.

In a box I received the other day from my friend Calverly are two specimens of a *Colias* like to, but distinct from *Philodice*. I have *Philodice* in all its varieties (Query; are not some of these species, with Boisduval?), but none came near to this. It is smaller and has no black border to the under wings, only a faint black tinge along two nervures. Its whole aspect is different. One is an albino, white where it should be yellow, but has a faint yellow tinge towards the inner margin of the anterior wings. I have two or three specimens of this variety of *Philodice*, but all differ much from these two. Both are ♀. The black, discoidal spot on the anterior wings is very distinctly pupilled with white above. It will not agree with any described by Boisduval, in the Suites à Buffon. I have a suspicion that

Hübner's figure, referred to by Boisduval under *Philodice*, belongs to the ♂ of this species; it does not seem to me to be *Philodice*.

Have you ever seen Hübner's Exotic Lepidoptera? Your *Ægeria cucurbitæ* is his *Melittia satyriniformis*, and *Ægeria exitiosa* is his *Paranthrene pepsidiforme*. *Crocota rubicundaria* is Boisduval's *Lithosia læta*, my 148. *Ctenucha semidiaphana* is Hübner's *Glaucopis fulvicollis*. Your *Clostera* he calls *Ichthyura inclusa* (Stephens has figured and described it as British, though he wants to persuade me his is a distinct species). There is a butterfly figured under the name of *Symphædra Alcandra*, said to be from Florida, which I do not know. It belongs to the *Nymphalidae*.

The insect I took to be allied to Stephens' genus *Thyridopteryx* (and it is) is a true *Oiketicus*, the same genus as Guilding's large species. His smaller one is nearer *Psyche*. I examined a male of Guilding's *O. Kirbyi* in Kirby's cabinet, now belonging to the Entomological Society. In color, markings and form, it comes close to Abbot's insect, but is larger, and the cocoon is of a different form. I mentioned to you that I had seen a specimen from South Australia allied to Stephens' insect. From what Gould tells me I have no doubt there is a large species there like *O. Kirbyi*. I have hunted our old collections in vain for Abbot's species.

The last time I saw Stephens, about four weeks since, all our conversation turned on the species of Lepidoptera supposed to be common to both continents. Of these *Cynthia Cardui* seems to be the one which offers the least real difference. We cannot find any, but the American *Antiopa* and *Atalanta* are known at once. I have had a good many Swiss specimens of *Antiopa* pass through my hands lately (though I have given most away now); all these I would at once have picked out however they had been mixed with American specimens.

Newman and I have had a great deal of discussion about what are properly mosquitoes; he maintaining them to be *Sim-*

uliæ, I *Culices*. He will have it that *Culices* are only called mosquitoes by the English and English Americans, and Walker, on Schomburgh's authority, says they are called zancudos by the Spaniards, and *Simuliæ* mosquitoes. Now I do not believe this at all. If you look in the last *Diccionario* of the Spanish Academy, you will see mosquitoe rendered *Culex pipiens*, and zancudo only *longipes*. Pray what is the very little sand-fly, midge or punky, of different parts of the States, which by river sides in the south, especially towards the sea, swarms by millions, enough to make one believe the stories we get from Hungary about their choking men and cattle? The same, or an allied species I found, or rather they found me, by thousands, on the hills south of Olean, N. Y.; but the most I ever saw were on the St. John's and Savannah rivers. They never were found far from shore.

As the word mosquitoe is Spanish, surely the Spaniards are the best judges as to what insect it belongs. I maintain we are right in following them, and the Germans are wrong, and Newman wrong in following the Germans, as he does in his grammar.

DOUBLEDAY TO HARRIS.

EPPING, Oct. 19, 1841.

Our success this year in capturing Lepidoptera has been owing very much to adopting a plan first brought to notice by Mr. Selby of Bedford,—brushing over the trunks of trees near our house with sugar. Every tolerably fine evening, a row of lime trees in one of our fields is sugared well for three or four feet from the ground, and in addition, boards similarly sugared are put out in a little plantation at the bottom of another field. Twice or thrice before nine or ten o'clock, my brother visits these with a lantern, and some nights takes a hundred moths. He also occasionally sends a boy into the woods to pursue the same plan there. In the woods there are sometimes swarms of particular species. One boy counted seventy specimens of *Glœa vaccinii* on one tree. My brother finds that coarse, strong-smelling sugar is to be preferred, and he generally puts a moderate quantity into a pan of water, and brushes it on with a large paint-brush just after sunset. I think you would succeed in this way in getting a great many moths. I wish I had tried it in East Florida and at Trenton Falls. In summer the blossoms of the lime-tree swarm with *Noctuæ*. We used to take a sheet and spread it on the ground under the trees, and strike them sharply. This would sometimes shake down forty or fifty moths at a stroke. Now the blossoms of the common Ivy (*Hedera helix*), which is just flowering, swarm with moths. By attention to these various modes of collecting, we have made our vicinity unrivalled as to the number of Lepidoptera collected in it.

Should I go merely for a short visit to France I mean to take a host of things for Boisduval's inspection. Especially your *Theclæ* and *Hesperiæ*. This reminds me of a "blue" I have described as *Polyommatus Lygdamus*, one of Abbot's. I told you about it. I find there are two species like *Argiolus* in America. I caught both, but only females of the Northern one. They have males from Nova Scotia in the Museum. It is clearly distinct from what I took in Carolina.

DOUBLEDAY TO HARRIS.

10 Newington Crescent, April 30, 1842.

I have not time to follow you in your remarks on the Notodontians now, but will soon write you more fully on the subject. I will, however, remark on a few of them, and on some of the others.

There appear to be two closely allied species known as the *P. albifrons*, one much smaller than the other. Of this more in a short time. The *Cerura* from the cabinet of the Entomological Club is figured by Abbot in his drawings with the larvæ, of which I will send you a tracing. I much doubt whether the beautiful Pyralidiform insect from Georgia is allied to *Notodonta.* It is figured by Abbot without a larva.

I found in the Museum, a few days since, some specimens of *Melitæa Ismeria*, collected by Abbot. It is nearer *M. Tharos* than Boisduval's plate would lead you to imagine. We have there a specimen of an insect I much want to get, and which I had fancied quite a Southern one, *Polyommatus Tarquinius.* Our specimen was taken in Nova Scotia by Lieutenant Redman, who sent a vast number of insects thence to the British Museum. This reminds me that I am now quite convinced that *pseudargiolus* of the North is not *pseudargiolus* of the South. There are two species. To which does the name belong? Boisduval's plate will not distinguish them.

I hope to go to Paris this autumn, or it may be sooner, and shall take all my North American *Theclæ* (thirteen species, I think) and *Hesperiæ* (about thirty species) to Boisduval, and if you think it worth while will take yours. Do you like to risk them? I would gladly take charge of them for you.

I find in the British Museum a large number of the true *Argynnis Aphrodite*, as named by Fabricius in the Banksian Cabinet. I have a fine series of varieties of *Cybele* Fabr. (as named in the Banksian Cabinet), varying in size and in the color of both surfaces, but in all the distinction from *Aphrodite* is quite clear. The Museum specimens were presented by Redman of Nova Scotia, but I hope to be able to get you one, though we have some trouble in giving away or exchanging specimens presented.

Newman was the author of the papers signed "Rusticus," though he sometimes pretends to deny it. *Hadena amica* Steph., is your American moth, and is not *H. amica* Ochs. The specimens reputed British are of Abbot's collecting.

HARRIS TO DOUBLEDAY.

CAMBRIDGE, Nov. 17, 1842.

Whether we shall be able to identify his [Newman's] species (in the "Entomologist") I cannot tell; and I fear that in some cases he may have raised varieties to the rank of species, and may have re-named and re-described some old species. I remember an error of his. *Leptura zebrata* of Fabr. is not identical with the *zebra* of Olivier. One is exclusively a Northern and the other a Southern species. I have both in my collection, and each exactly agrees with the original description.

The name *Polyommatus pseudargiolus* must be applied exclusively to the Southern species, if the Northern blue species is distinct from it. *Deutargiolus* would be a good name for the Northern species.[1] Your specimens will enable you to point out the distinctive characters, which I shall be glad to see from your own observations, as well as those by which you separate *Argynnis Aphrodite* from *Cybele*.

HARRIS TO DOUBLEDAY.

CAMBRIDGE, Feb., 1844.

For more than a year I have made only two entomological discoveries of any consequence. One of these is finding, in September, *Anthribus fasciatus* Olivier, an insect unknown to Schönherr, which heretofore I had supposed to be a rare and exclusively Southern species. I have obtained several specimens from a black, spherical fungus, stroma to *Sphæria concentrica*, growing on the *Platanus occidentalis*. The larva inhabits and undergoes its transformations in this fungus, which affords food to it and to the perfect insect. The *Anthribidæ* have generally been supposed to be parasitical insects; but this species and some others I know to be fungivorous. The *marmoreus* of Olivier (= *lunatus* Fabr.) lives upon a tree *Boletus*, and the *variegatus* of Say upon the smut of wheat (*Uredo segetum*) and other grains. The other discovery is that of considerable numbers of the rare *Horia sanguinipennis* of Say, taken early in April on the sands beyond Mt. Auburn. They had apparently just come out of holes in the sand. These insects never fly, being wingless, but crawl about upon the sand, and probably lay their eggs in the burrows of some of the sand bees or other fossorial Hymenoptera, several kinds of which inhabit the spot. The males are distinguished from the females by their thicker antennæ, and by having a longitudinal row of four velvet-like patches on the ventral surface of the abdomen.

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[1] [It has since been named *L. neglecta* by Mr. W. H. Edwards.]

HARRIS TO DOUBLEDAY.

CAMBRIDGE, Dec. 12, 1845.

Some of my agricultural friends have sent me specimens, in various conditions, of an insect which has committed great devastations in some portions of this country; and I am called upon to give an account of the insect. I have had a bottle full of the moths from Virginia; and though they are all more or less rubbed and damaged, they will serve for the purpose of examination to determine the genus. From specimens in the larva state, sent from Worcester, Mass., I was so fortunate as to obtain a very few (five only) of the moths in good condition.

By the tabular sketch contained in Latreille's Familles Naturelles it appears that these insects belong to his genus *Œcophora*, a genus, however (in the extent he gave to it), which does not seem to be admitted by modern entomologists. I suppose that Haworth would have put the insect in his genus *Recurvaria*. I have Humphrey and Westwood's British Moths and Westwood's "Synopsis of the Genera of British Insects," and have endeavored to make out the genus by these works, but do not find the insect in question to agree entirely with the generical definitions taken together from both these works. I have compared my insect, and find it comes nearest to *Anacampsis nivella* and *blattariella* (which Mr. Curtis sent me) in generic characters. The last joint of the palpi, however, is somewhat longer in my insect than in the two species last named. You will perceive that the form of the hinder wings of my insect is peculiar, and resembles that of these two species of *Anacampsis.* I have tried my insect particularly for the genera *Anacampsis*, *Laverna*, *Cleodora*, *Acompsia*, and *Ostyages*, as defined by Westwood. These authors say of *Anacampsis*, "tongue shorter than palpi"; in my insect it is much longer. Of *Laverna* they say, "palpi, second and third joints of equal length"; in my insects the third joint is the longest. Of *Cleodora* they say "palpi slightly recurved"; in my insect they are more than slightly recurved. Of *Anacampsis* (*Butalis* in part) they say, "hind wings broad, not attenuated at the outer angle"; in my insect the hind wings are narrow, and are suddenly attenuated at the outer angle. Of *Ostyages* (*Butalis* in part) they say, "maxillæ very short," etc.; the maxillæ or tongue in my insects is half the length of the antennæ.

I have reason to believe that this insect under consideration inhabits Europe; that it was known and described there more than eighty years ago, and that it was introduced thence into America, where it has multiplied to an alarming extent.

DOUBLEDAY TO HARRIS.

British Museum, April 16, 1846.

To-day Curtis called here, and on looking at Duponchel, Supplement, 85, we find that your insect seems to be near, if not identical with, the grain moth of France described by Reaumur. It is the *Œcophora granella* of some, the *Butalis* *cerealella* of Duponchel. M. Hupin has published a memoir on it in the *Annales de l'Agriculture Française* for June, 1838, and again in 1842.

I have lent Curtis your book. He says it is "the best book of the kind ever published." He will, however, put his opinions on paper. I hope you were pleased with Mr. Spence's opinion.

HARRIS TO DOUBLEDAY.

CAMBRIDGE, Oct. 24, 1846.

About a week ago, I received, by mail, a plate from Duponchel's Lépidoptères containing a figure of *Butalis cerealella*, and suppose that you must have been the sender of it. Allow me to make some further comments on this insect, and the genus to which it belongs. I take it for granted that some species, at least, if not the *cerealella* included by Duponchel in his genus *Butalis*, must be found in England. This genus either is or is not a good one. If good, why is it not recognized and adopted by English Lepidopterists? If not a good and legitimate genus what do English Lepidopterists do with the species contained therein? Some of the species perhaps they put in *Acompsia*; in what genus are the rest arranged? Mr. Curtis referred me to his genus or sub-genus *Laverna*; does he still consider it as belonging thereto? And Westwood (Genera, p. 110) states that in *Laverna* the second and third joints of the palpi are of equal length, and that the head is short and broad. In my insect the third joint of the palpi is evidently longer than the second, and the head is not broad. My principal object in applying to you relative to this insect, was to ascertain to what genus the best British Lepidopterists would, without reference to Duponchel, refer this species, if it be at all referable to any British genus. If it cannot be included in any such now existing, it must be the type of a new genus.

Probably you have heard of the "army worm,"a caterpillar, that invades the cotton fields of the Southern States, and has this year destroyed at least one third of the crop in Louisiana and Mississippi. Several communications have been made to me respecting it, and a correspondent in Mississippi having, as he states, profited by my book on destructive insects, so far as to be able to trace the transformation of the army worm, has recently sent to me in a letter some specimens of the moth developed from this worm or caterpillar, with a description of the caterpillar. The moth was new to my collection, and though a good deal injured in transmission, is yet in such a state that the genus might be made out by one familiar with the modern genera. From the habits of the larva it seems to me that the insect must approach near to the genus *Cosmia*. My correspondent states that the larva is green, with longitudinal stripes of yellow on the sides, and along the back two black ones separated by a very narrow line of white. They are also studded with black dots, each one producing a black hair. The legs are sixteen. When about to pass into the chrysalis state, the larva draws together the edges of a leaf with silken threads, so as to form a scroll, within which the transformation takes place. Mr. Say described the moth from very bad specimens, under the name of *Noctua xylina*. I have been requested to redescribe it correctly, and wish to give to it the name of the modern genus, to which it may belong. I expect soon to have the means of raising this insect under my own eye, having sent for eggs, which I shall place on some cotton plants now growing in pots; and hope in this way to be able to give a more exact and faithful account of it than has heretofore appeared. In Brewster's Edinburgh Encyclopædia, article Cotton, there is an account, by Dr. Chisholm, of the "Chenille" destructive to cotton in British Guiana, — an insect, apparently a geometer, differing from ours.

HARRIS TO DOUBLEDAY.

CAMBRIDGE, March 20, 1846.

And now, as business presses hard on me, I must improve the present moment to make some remarks on the specimens of insects sent to you, for exhibition to the English Entomologists. Please to open my "Treatise" at page 365, near the bottom of which you will see the words — "Fly-weevil that destroys wheat." This is, or was the Virginia name of the little moths sent you. Specimens of this same "fly-weevil that destroys wheat," which has done, and still continues to do incalculable mischief in the granaries and wheat mills and storehouses of this country, are in your possession, and I hope in good condition. The insect has been known to the farmers and millers of our wheat districts nearly a hundred years, and yet a correct scientific description of it has never been published here, unless the account of the foreign insect contained in my "Treatise" be considered as applicable to it. Wheat is not raised or ground in this vicinity. We get our flour mostly from New York and Baltimore; hence the insect was unseen by me when my book was written. Since then I have seen it, in all its stages, and have had the moths living before me, and have observed their manners, in confinement it is true, but where they have propagated for more than a year. Sometime before writing the article above referred to, I had come to the conclusion that the fly-weevil of Virginia was a co-species, and perhaps, identical with the Angoumois moth; and, if I mistake not, I pointed out in a letter to you, the synonymy of the European insect, and the blunders of entomologists about it. Before publishing a better account of the American insect, I wanted to know what the best British Lepidopterists would call it, and whether they would recognize it as a European species, without disclosing to them what I knew and what I suspected about it. Even to you I did not disclose my views, because I hoped to have your own opinion uninfluenced by mine. I regret only to have received

Mr. Curtis's opinion as to the genus, without any information whether the species was known. Is not the Angoumois moth in the British Cabinets? You state that Mr. Curtis refers my insect to "a section of *Anacampsis* formed by Curtis into his genus *Lucerna*, and refer me to his figure of *L. ochraceella*, a species allied," etc., in plate 735 of Curtis's British Entomology. This work is not to be found here; and moreover the genus *Lucerna* and the species *ochraceella* are not contained in Curtis's Catalogue, of which he sent a copy to the Library. Have you not made a mistake in the name? In Westwood's Synopsis of Genera, annexed to his Introduction, p. 110, I find the genus *Laverna* Curt. characterized; and in Humphrey and Westwood's British Moths, Vol. II, p. 188, under *Anacampsis sarcitella*, I find this note. "Mr. Curtis forms this, *marmorea*, *atra* and *ochracella* (*ochraceella?*) into the genus *Laverna*." Westwood and Humphrey do not give any description of their so-called *ochracella*; and as to the notorious Angoumois moth (or by whatever name entomologists please to call it), it does not figure, and is not noticed in the "British Moths." Well, I suppose Duponchel will have it in due time; but I do not want to see what he may say, before the opinion of the English Entomologists comes to hand. He alludes to it as a species not yet before him in good state under the name of "*Alucite des grains.*" Lép. de France, T. xi, p. 450, putting it in the genus *Œcophora.*

The habits of our "Fly-weevil" agree exactly with those of the Angoumois moth as described by Reaumur, Duhamel and Tillet. As you may not have my old letter at hand, and as the references in my treatise were not full enough, allow me again to disentangle the synonymy of the European moth in question.

Chenille qui vit dans les grains de différents blés, et principalement dans les grains d'orge. Reaumur, Mémoires, II, p. 486, pl. 39, fig. 9–21, 1736.

L'insecte qui dévore les grains de l'Angoumois. Duhamel et Tillet, in Hist. de l'Acad. Royale des Sciences, Année 1761, p. 66; and Mém. de l'Acad. Royale des Sciences (1763), p. 289, pl. 8, 9, 10. Histoire d'un *In-*

secte qui dévore les grains de l'Angoumois. Par Duhamel et Tillet. 12mo. Paris, 1762, with Plates.

Alucita cerealella Olivier, Encycl. Méth., Insectes, IV, pp. 114, 121 (1789).

Œcophora. La teigne des blés Latr., Règne Animal, 1re édition, III, p. 580 (1817).

Œcophora granella Latr., Nouv. Dict. d'Hist. Nat., XXIV, 226 (1818).

Tinea hordei Kirby and Spence, Introd. to Ent., 3d edit., I, pp. 173, 175 (1818). The same. 5th edit., I, p. 174 (1828).

Ypsolophus granellus Kirby and Spence, Introd., 5th edit., I, p. 174 (1828).

Alucita cerealella Tigny and Guérin, Hist. Nat. Ins., IX, 298, 301 (1830).

Œcophora cerealella Lam., Hist. Nat. Anim. sans Vert., 2e éd., IV, 189 (1835).

Tinea cerealella Oken, Allg. Naturg., V, 3, p. 1204–7 (1836).

Œcophora. Alucite des grains Godt. and Dup., Hist. Nat. Lép. de France, XI, 450 (1838).

Tinea granella Westwood, Introduction, II, p. 410 (1840).

Œcophora cerealella Harris, New England Farmer, XIX, 300 and 306 (March, 1841).

Anacampsis cerealella Harris, Report on Insects of Massachusetts, p. 365 (1841). The same. Treatise on Insects, etc., p. 365 (1842).

In the little box sent to you there were some other insects. A mutilated specimen or fragments of a moth, the generical name of which I should be very glad to know, and also whether the species is new to you. Only two specimens have been met with, both taken at New Haven. There was also the larva case of the species of *Porrectaria?* Haworth, *Ornix?* Duponchel, a very common insect on fences; but the moth I have not succeeded in rearing.

DOUBLEDAY TO HARRIS.

BRIXTON, April 2, 1847.

The genera of *Tineidæ* are a mass of confusion. In the *Tortrices* and *Tineæ*, Stephens, Curtis, etc. have made endless genera without any good characters. At least one half their species are worthless; in some cases, as in the genus *Peronea*, ten or twelve species are made out of one. M. A. Guénée, formerly of Chateaudeau, now of Paris, is the best authority, and is now occupied on them. The first part of his work is published in the Annals of the Entomological Society of France. He is now at work upon the *Tineæ*. I will forward specimens of your insects to him.

Your Cotton Moth is near to *Ophiusa*, but is a new genus. We have nothing exactly the same. I have searched through Abbot's drawings and cannot find it. At present I am so occupied with the Butterflies that I can find no time for other groups; but in a few weeks I hope to begin on the *Bombyces*. I have just got the last sheet of our Catalogue of Diurnal Lepidoptera, Part 2, in press. This contains the *Erycinidæ* and *Lycænidæ*, above six hundred species. I have yet the *Hesperidæ*, about four hundred species, to do. The first part of our Diurnal Lepidoptera appeared in January, 1845. This contains thirteen hundred and fifty species, the second part six hundred. Add *Hesperidæ*, about four hundred; additional species to part one, since January, 1845, about four hundred; this gives two thousand seven hundred and fifty species of Butterflies.

The Museum occupies me six hours a day, and I live three miles from it, so that is eight hours occupation daily. My book takes me full thirty-six hours a week, or five hours daily. I belong to eight London societies, and am in committees or on councils of several. I have to do a good deal to help Boisduval and Guénée in the Suites à Buffon, and occasionally lend a hand in other books. I have correspondents from Labrador to Valparaiso, from Copenhagen to New Zealand. You will see that this is plenty of work.

HARRIS TO DOUBLEDAY.

CAMBRIDGE, March 24, 1849.

Last April I captured another species of *Brephos*, which is the analogue of the *Parthenias* of Linnæus and of the French and German Entomologists, and equal to *Notha* of the English collectors. The antennæ are not pectinated in the male. It is more highly colored than English specimens of the genus, and rather smaller also. I name the species *Hamadryas* [Pl. I, fig 4].

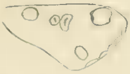

Fig. 24.

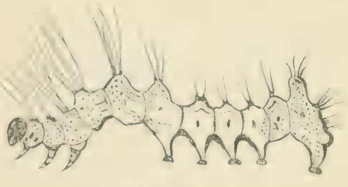

Fig. 25.

Before beginning this letter I sketched some insects on the top of the opposite page, and now ask your attention to them. I am not sure (not having kept copies of all my letters) whether I may not have sent you a sketch of my 716 before. Rude as the figure is, you will know the insect, if you have ever seen it in nature. The fore wings are white, with black markings, somewhat like those of your *Psilura monacha*, and there are three rich, brown spots on each fore wing. The antennæ are simple in both sexes. The thorax is not crested. The abdomen has three or four elevated dorsal tufts, as in some species of *Plusia*. Now look at the singular, humped larva by the side of it, and you will see from what this beautiful moth comes. Head blackish; body black and white, as in the sketch, and highly polished. It is found in August and September on the *Prinos verticellata*, and also on the Lilac, the leaves of both of which it eats. When the time for pupation arrives, the larva, invariably I believe, gnaws a cylindrical burrow in a limb or twig, selecting in preference one which is dead and dry, and retires into this cavity, the mouth of which it covers with a web of silk. Not unfrequently the insect remains in its retreat a long time before becoming a pupa, and the perfect insect will then not be disclosed before the second summer afterwards in the month of June. I should not forget to state that when the caterpillar is at rest on the plant, it raises the fore part of the body, and if disturbed wags it violently from side to side. The head of the young larva is armed on the occiput with two little corneous tubercles, which, however, disappear after two or three moultings. This insect is the *Notodonta sexguttata* of my MS.; but I wish some competent person would compare the moth with *Thyatira batis*, and let me know if it may not be near to that species in generic characters.

My No. 38 (a very common insect here, and a form of which we have several species) you referred in one of your letters to *Ophiusa crassiuscula*. The discovery of the larva by your little namesake removes the insect to another group, and proves it to be a true *Euclidia*. Edward's specimens made cocoons of a dried leaf, interwoven with a little silk, in which the larvæ were changed to pupæ, covered with a bloom like that of the pupa of *Catocala*. The attitudes of the larvæ, which I have tried to represent, are very odd. Color brownish white, with darker longitudinal stripes, and two black dots on each side of the body. The species is the *Noctua gemina* Fabr., *erecthea* Cramer.

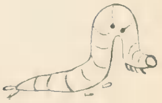

Fig. 26.

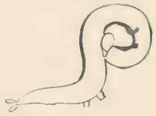

Fig. 27.

I have also sketched three forms of *Limacodes*, making, with Smith-Abbot's *pithecium* and *cippus*, five different forms of the American species of the genus. Some writers state that the prolegs in *Limacodes* are retractile. This is not true of our American species, which are entirely destitute of prolegs. The alternate contraction of the muscles attached to the abdominal folds serves, instead of prolegs, to assist the insects in moving.

The larva, represented on the left [Pl. II, fig 10], stings by means of the prickles wherewith the tubercles are beset, and not by a retractile stinging apparatus, described by Duncan as belonging to his *Doratifera vulnerans.* Our stinging *Limacodes* wounds with its external armature in the same way as the larva of our *Saturnia Io.* Of the tubercles, besides the four long, conical ones, there are four of a spherical form before, two behind, and one on the side of each segment of the body. Body before, behind and beneath, and an oval spot on the back, reddish-brown; sides and rest of the back green, bordered with a white line.

The next figure represents a very different larva; in form somewhat like an *Oniscus*, being oval and flattened, with lateral tooth-like appendages fringed with hairs. General color green, with lateral rows of minute, ocellated spots, each pupillated with a black dot; a dorsal row of dark spots, with two of a rich scarlet color (in the figure black). Sonrel has made me a magnified sketch of this curious larva [Plate II, fig. 7; Pl. III, fig. 6], showing the beautiful manner in which its body is delicately variegated. This insect does not sting.

The third form [Pl. III, fig. 8] is that of my *Limacodes scapha.* It is a "chunky" larva, almost lozenge-shaped, with the back concave and the sides turned up, somewhat like an old-fashioned cocked hat. Color green, edged and variegated with brown.

Limacodes cippus [Pl. II, fig. 2], approaches somewhat to my first figure, but is still different, having a greater number of elongated tubercles, not beset with stinging prickles.

Limacodes pithecium is occasionally injurious to fruit trees. It casts off its singular, lateral, velvety appendages before making its pea-shaped cocoon, and then has the form of a kernel of coffee.

I have not succeeded in obtaining the winged insect from the first figured *Limacodes*, my specimens having died in consequence of the attacks of the little Ichneumons wherewith they were infested. The onisciform *Limacodes* has not left the puparium.

I hope to get a good supply of Say's *Hipparchia semidea* for you. Say has pretty correctly figured it in his American Entomology, Vol. III, Pl. 50, and states that it "inhabits the White Mountains of N. H., and appears to be limited to that inhospitable region," which I believe is strictly true. Boisduval, in his Icones historiques des Lépidoptères nouveaux, etc., Vol. I, p. 197, under *Chionobas Also*, makes the following blundering remark: "*J'ai reçu de M. John LeConte, sous le nom d'Eritiosa (!) de Harris (!!) un individu pris dans les montagnes calcaires (!!!) de New Hampshire, qui me parait appartenir a cette espèce.*" Boisduval's *Also*, published in 1832, is very possibly identical with Say's *semidea*, published in 1828; and if so, the latter name alone can stand. The specimens which LeConte sent to Boisduval he received from me, with Say's *Ægeria exitiosa*; whence, probably, the blunder of the specific name. My specimen of *Hipparchia semidea* was taken on the summit of Mt. Washington, one of the loftiest peaks of the White Mountains, which, by the way, are not "*montagnes calcaires.*"

HARRIS TO DOUBLEDAY.

CAMBRIDGE, Oct. 29, 1849.

I have now a few insects for you, and am seeking a safe conveyance of the parcel containing them. I think that I shall venture to send you a lot of follicles of *Oiketicus* [*coniferarum* Harr. MSS.] containing female pupa cases, filled with eggs. Should these reach you safely and unhatched, you can hang the cases in some trees, and thus probably get a brood or two of the insects next spring. The larvæ eat the leaves of many kinds of trees, but especially those of cypress, larch and hemlock, also of linden, maple, and even of fruit-trees. The species is probably the same one noticed by you in your acceptable letter in the Entomologist for May, 1841, pp. 97–8. Abbot's figures are caricatures rather than likenesses of this insect.

The follicles vary in their outer covering according to the tree on which the insects live. Those from the *Thuja occidentalis* are the most beautiful, especially when recent. Those from deciduous trees are generally covered with bits of twigs, and of the petioles of leaves, arranged longitudinally. Those of the males are much smaller than those of the females, have the lower orifice more prolonged, forming a long, nearly cylindrical neck, and are generally covered with bits of leaves, sticking out on all sides. The larvæ carry about these follicles till they have done eating, fasten them by a few threads to the branch or leaf when they wish to rest; and when they want to descend from one limb to another, they let themselves and their pods down. Hence they are commonly called "drop-worms" in Philadelphia, and sometimes "basket-worms." The larva has ten prolegs; but these are exceedingly short and retractile, so as to expose only the coronet of hooks with which they are furnished. The true legs, on the contrary, are very robust, increasing in size from the first to the third pair, and united in pairs by enormously lamelliform coxæ. The male and female pupæ are very different from each other, in size, form and structure; that of the male being much the smallest, provided with visible wing cases, etc., and with a less prominent carina on the top of the thorax. The male pupa forces itself half way out of the cylindrical lower orifice of its follicles when about to disclose the winged insect. I should have stated above that the follicles have two openings; one above, through which the larva protrudes its head and legs when feeding and moving about; and to the edge of this upper orifice it fastens the strong silken loop, by which the pod is permanently fastened to a twig when the insect has come to its growth. It then turns around in its follicle, so as to have its head towards the lower orifice, and

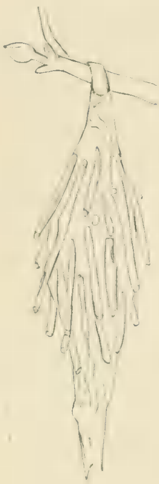

Fig. 28.

thus awaits its transformation to the pupa. The weight of the follicle and the included insect is sufficient to close the upper orifice after the pod is suspended. The males are disclosed in September and the early part of October, and immediately afterwards the females will be found to be impregnated. I examined about fifty female follicles on the 25th of October, and found all the females escaped, and their puparia half full of fertilized eggs. It is not true that the females remain in their puparia or in their follicles. Among all those examined as above-mentioned, not a single female was discovered; they had come out of their pupa-skins and had also left their follicles. It is only at an earlier period, or in some rare cases when the females have remained unimpregnated till this time, that any females are to be found within their pupa-skins. But they do not leave their pupa-skins until they have been impregnated and have laid their eggs.

How the male contrives to get at the female is a mystery that I have not yet solved. The pupa-skin of the female splits in the middle of the little carinated ridge found on the top and fore part of the thorax, and also laterally, so as to admit of a kind of T-shaped opening. It is through this that the male organ must be introduced, and passing between the back skin of the pupa and the body of the female, reach her hinder extremity in the bottom of the pupa-skin. But in addition to this extent to be penetrated, the male has to penetrate the whole length of the lower orifice of the follicle, say half an inch, before he can reach the head of the puparium. The female lays her eggs in the puparium, or pupa shell, receding from the bottom of it as she does so, and filling the shell half or two thirds full of eggs; the rest of the shell she fills with a fawn-colored down rubbed off her own body. You will find these pupa-skins thus charged with eggs and down, when you open them.

When her work is done, the female crawls out, a mere emaciated skin, and makes her escape out of the cocoon. ' The

T-shaped slits in the pupa-skin close by their own elasticity, so that the pupa-skin seems at first to be entire. I have only one perfect specimen of the male [Pl. III, fig. 4.]. It has curved antennæ, doubly pectinated to the tip, but the pectinations suddenly reduced in length towards the tip. The insect therefore seems to be a true *Oiketicus*. There is no white spot on the disk of the wings, which, however, are semi-transparent, and only furnished with scales on the margins and nervures.

I have not yet finished my investigations of this interesting insect, and propose to continue them another year, should I live and succeed in raising a brood of larvæ in my garden. Then I hope to give you in print a full account of this *Oiketicus*, unless Mr. Gosse favors us with the same. Perhaps he has already published his observations; if so, please to let me know where they are to be found. [See a letter from Dr. Harris to Miss Morris, Sept. 25, 1850.]

If there be any such thing in nature as affinity between genera, I am convinced that *Oiketicus*, *Psyche* and my *Perophora Melsheimeri* are allied in this degree and all three of these genera nearly related to *Limacodes*, on the one hand, and to *Zeuzera* etc., on the other.

CORRESPONDENCE

BETWEEN

THADDEUS WILLIAM HARRIS

AND

EDWARD CLAUDIUS HERRICK.

CORRESPONDENCE.

HERRICK TO HARRIS.

NEW HAVEN, Jan. 24, 1840.

You ask me to point out the errors in Mr. Say's account of *Cecidomyia destructor*, referring doubtless to that contained in the first volume of the Journal of the Academy of Natural Sciences of Philadelphia. These I must mention entirely from memory, as I cannot now go into a minute comparison of his paper with my notes; however, I feel quite confident that what I say will not be erroneous. The matter was always exceedingly interesting to me, and my memory on the subject is very clear.

With the description (p. 45 of Vol. I, supra) I have little fault to find, except that it might be much improved by a new casting over. P. 46, line 1: "thighs furnished at the tip with several very acute claws" is most probably incorrect, as I have searched for them in vain. As regards the importation of the Hessian Fly, I am decidedly of the opinion that it was imported, and probably from Europe, and that it is not a native of this country. I have not time to go into the evidence here.

As to its being absolutely unknown in Europe, strange as it is, I am inclined to think that it is unknown to their entomologists, as existing there; but I have certain proof that the animal existed there in abundance in the year 1834, and have good reason to suppose that it has injured wheat there for a century or more. Mr. James D. Dana, whom you doubtless know, had frequently assisted me in my examinations of the Hessian Fly and parasites, and of their habits and metamorphoses; and when he went to Europe, in 1833, in the Delaware, I gave him a card containing a drawing and description of the animal, with directions and inquiries to be followed and made. Moreover, he was at that time personally acquainted with the Hessian Fly, and could, I think, identify it certainly. On the island of Mahon, and also near Naples, he found the identical insect in wheat stubble; he saw the perfect insects, the pupæ and the larvæ. He sent me in the seal of a letter three or more specimens of the imago, and when he returned he brought several glass tumblers containing the culms of wheat with the pupæ upon them. After the best comparison I could make I thought the insect identical with the Hessian Fly of this country. This was also his opinion. It is truly astonishing that their naturalists have not found it out. I fear they have already, for Dr. Hammerschmidt, of Vienna, published three or four years since a pamphlet on a two-winged insect which injures wheat in Hungary.

Kirby's *Tipula tritici* is doubtless a congener of the *C. destructor*, and exists in this country, at least in New Haven, in abundance. I cannot find out, however, that it injures the wheat here, which induces me to suspect that it is a different, though closely allied species. Kirby's description is quite too imperfect.

Page 47 has many errors. Line 3, "eight" might as well be fifty or a hundred, or perhaps a larger number. The assertion in the next sentence has always surprised me, for it seems as if he states what he had actually seen. But the statement is certainly untrue, and, I may say, the fact is impossible. The oviduct is so short and so soft that it would be impossible to thrust the egg a twentieth of an inch between the culm and the vagina of the leaf. The sentence is all wrong. Hundreds of times, in all varieties of seasons, have I seen the animal depositing her eggs. She lays them on the upper surface of the ligula of the leaf of the young wheat plant, and never attempts to deposit them at the axilla. The animal, when it leaves the egg, crawls down the leaf, descends within the vagina of the leaf, stations itself on the culm, generally just above the nearest joint of the stalk, and never moves from its place until the imago appears. Generally, perhaps always, the larva becomes a pupa before winter; I mean the larva resulting from the egg laid on wheat planted in August, September or October.

Mr. Say was entirely wrong in referring the parasite (I should say the chief parasite, for there are three others besides the egg parasite) to the genus *Ceraphon* of Latreille. It is undoubtedly a *Eurytoma* of Illiger. The description is tolerable, but may be much improved.

Page 48. According to my observation, the *Eurytoma* does not (nor does any other parasite) attack the larva of the Hessian Fly. They all wait until the larvæ have become pupæ. This may not be universal. I see no reason why it should be.

At page 63, it is stated that the so-called *Ceraphron destructor* throws off its wings, etc. This is not true. I have kept many of them six weeks without any such results, and never saw anything in my intercourse with them which induced me to suspect it. But it is certain that many of them are evolved with only rudiments of wings. I have seen them come out of the puparium in this state. This apterous animal is so similar to the female that I have considered it the same species; but I hardly know how to consider it. In the field I have never seen these apterous ones ovipositing or *in coitu*. Are they neuters? and if so, for what use?

Page 64, line 17. It is ridiculous to attempt to show the hole made by the parasite in ovipositing, as it is probably less than the ten thousandth part of an inch in diameter. I never could discover it, even when I knew within a tenth of an inch where the puncture was, and employed an excessive magnifyer. Such holes as are represented on the three central stalks are very familiar to me, and were unquestionably made by the parasites eating their way out from the puparium of the Hessian Fly. The figures of the *C. destructor* are only tolerable. In fig. 3 a. b., the antennæ of ♀ and ♂ are interchanged. The figures of the parasites are very much worse. The antennæ of the male are pretty correct, but those of the female could scarcely be recognized.

As to the habits of the Hessian Fly, the account which contains the least errors and the most truths is one by Dr. Chapman, in a volume (fifth, I think,) of the Memoirs of the Philadelphia Agricultural Society.

Of the genus *Cecidomyia* there are five or six other species in this region; one of which, as I said before, is often seen about the heads of wheat while flowering, chiefly at or a little before sunrise. I have made partial descriptions of some of these, and did intend to publish descriptions of all the American species of this genus; but I fear I shall never be able to do it. The Hessian Fly is much the largest species (in size, of course) of the genus, — among those found here, at least.

The egg parasite of the Hessian Fly I discovered in 1833. There are at least one hundred species of this genus *Platygaster* already described and published, and I fear that this may be one of the number; but many of the descriptions are too imperfect for me to decide.

My investigations of the history of the *Cicada septendecim* have nearly satisfied me that taking any one region, the insects do really come in swarms only every seventeenth year. Whether they appear singly in intermediate years I am unable to say. So many periods are now established in different parts of the country, however, that we must suppose that the regularity of their appearance is sometimes disconcerted by vicissitudes of weather or other causes.

HARRIS TO HERRICK.

CAMBRIDGE, Jan. 1, 1841.

Are you aware that the genera *Cecidomyia*, *Lasioptera*, etc., have been revised by Haliday and other English entomologists? In *Cecidomyia* are now included those gall-gnats, etc., in which the antennæ, especially in the males, are long, and in which, moreover, the joints are verticillate and pedicellate; the basal joints of the tarsi are very minute; the wings (generally) have two longitudinal and one furcate nervure; species, *C. tritici*, etc. In *Diomyza* Megerle (*Lasioptera*, Div. *A*, Meig.), the antennæ are short, the joints not verticillate nor pedicelled; the basal joint of the tarsi is short; the wings have one longitudinal and one furcate nervure; the costa is thickened and black, with a whitish stigma; species, *L. berberina*, *albipennis*, *picta*, etc. In *Lasiopteryx* Stephens (*Lasioptera*, Div. *B*, Meig.), the antennæ and the nervures of the wings are as in *Diomyza*; the basal joint of the tarsi is long; species, *L. obfuscata*.

You will perceive that the Hessian Fly cannot go into *Diomyza* on account of its (male) antennæ; nor into *Lasiopteryx* on account of the tarsi. As to the nervures of the wings, I think that you will find them to vary somewhat in the species, as they do in many other genera.

I have no objection to calling the dried larva-skin of the maggot of the Hessian Fly a *puparium*, though I think the term pupa when applied to it rather incorrect. I supposed, of course, that the included pupa had its own appropriate skin, like the pupa of all other flies which are coarctate; but I was not prepared to believe implicitly in Mr. Havens' statement that the insect came out of the puparium before it threw off its proper pupa skin. Is this true?

I have never supposed our barley insect, the larva of which lives within the culms of the barley, was the same as the *Cecidomyia destructor*; and am inclined to believe that it is either the barley midge (*Tipula? cerealis*) of Europe, or a species closely allied to it, and probably also belonging to the genus *Cecidomyia.*

HERRICK TO HARRIS.

NEW HAVEN, March 29, 1841.

The supposition that the *Cecidomyia destructor* lays her eggs on the ripening grain, involves various improbabilities and impossibilities. 1. The egg is very delicate, covered only by a fine cuticle, and if on the seeds of wheat, would be crushed when they are thrown together. 2. It will hatch within ten to twenty days after it is laid. The wheat is sown in two or three months after; of course the larvæ must have all perished, for they cannot eat grain, but can only suck the juices of the plant. 3. If the egg is hatched in the earth, it is scarcely possible that the larva can crawl to its usual position, between the sheath of the leaf and the stalk. 4. Whence come all the larvæ which we find in the young wheat in the spring?—not to ask the origin of the eggs themselves, which we may find abundantly in April and May on the leaves of the young plants.

Having planted wheat in my garden every year since 1832, and watched with great assiduity and interest the operation of the Hessian Fly, both there and in open fields, in many hundred instances, I feel absolutely sure that this insect does not lay her eggs on the head of the wheat, but that she does deposit them on the (upper surface of the ligula of the) leaves of the young wheat, both in autumn and spring.

It is a very proper inquiry,—what do these people actually see who assert that the Hessian Fly lays her eggs on the head of the wheat? I have long been inclined to believe that the *Tipula* (*Cecidomyia*) *tritici* of Kirby attacks wheat in this country, and also that the moth (allied to the *Tinea granella* Linn.) described in Duhamel's Histoire d'un Insecte, etc., is also to be found with us. In Jas. Mease's Archives of Useful Knowledge, Phil., 1812, Vol. II, p. 45, is an article by Jno. Sorain of Tackoney, Md., stating that this wheat moth had destroyed much wheat in some of the Middle States. He says it appeared about forty-five years before, and gives a mode of destroying it. He mentions that it is attested by Benj. Mifflin (in Bailey's United Mag., 1777), that in 1776 the wheat moth did immense mischief in Kent Co., Del. I have never seen this moth; but think it highly probable that the insect (which I believe is alleged to lay her eggs in the ripening grain), attacks our wheat in some regions, and has been mistaken for the Hessian Fly. The *C. tritici* lays her eggs among the flowers of the wheat. Now I have often seen in June, about sunrise, many insects of this genus, but much smaller than the Hessian Fly, sporting about the heads of the flowering wheat; yet I never could detect them laying eggs. However, I have often found minute red larvæ within the glumes of the ripening grain, but they did not appear, in numerous cases which I have examined, to have done any harm to the grain. I have endeavored to ascertain their further history, but in vain. It is probable that the *C. tritici* injures the grain in some parts of our country, but perhaps not to any great extent.

With regard to the European origin of the Hessian Fly, I have, for many years, had little doubt. By this I mean, of course, that our insect was imported from Europe, and not that the insect was first created in Europe, for it may have come from Asia. In Duhamel du Monceau's Élémens d'Agriculture (Paris, 1771, Vol. I, p. 299) you will find some account of an insect which is most probably our *C. destructor*. In May 1755, the wheat was attacked:—"*Nous y trouvons une quantité de petits vers blancs, qui, dans la suite, deviennent couleur de matron; ils se postent entre les feuilles et rongent les tuyaux; on les trouve ordinairement entre le premier nœud et les racines, etc.*" Further on he speaks of larvæ in the head of the wheat, one of them of "very red carmine" which may be the larva I have seen here.

I cannot propose any remedy which will be likely to be adopted. Steeping the seed is of course useless as regards our insect, and probably every other, except so far as it contributes to the vigor of the plant. If immediately after the wheat is reaped in July, the stubble is burnt, and then plowed in and harrowed, the insects then in the pupa state would be destroyed. If this were done universally, we might extirpate the insect. But it never will be done to any great extent. Feeding off the young plants while the eggs are on the leaves would destroy vast numbers, and would not much retard the growth of the wheat.

The parasites cut off a large portion of every year's generation. In this region of country I am safe in saying that on this account principally, not one egg in fifty produces a Hessian Fly; but the destruction comes too late for that season, as it does not take final effect until the insect assumes the state of pupa.

I have observed four parasites. 1st. A species of *Platygaster* which attacks the eggs. 2d. The *Eurytoma* (not *Ceraphron*) *destructor* of Say, which attacks the pupa; this is the principal parasite of the pupa. 3d and 4th. Insects of the tribe *Chalcididæ* or *Oxyuri.*

HERRICK TO HARRIS.

April 24, 1841.

On looking at your former letter, I find a question which I think I have never answered. The puparium (pupa-case) of the *Cecidomyia destructor*, which is of a brown color and leathery texture, is formed from the skin of the larva; this skin gradually becomes brown, the pupa (or larva changing to pupa) gradually cleaves off from this skin, and in two or three weeks is wholly detached. This is the fact regarding the larva of the *C. destructor*; but nine-tenths of all which one may chance to examine will contain a parasitic larva. It was a long time before I could distinguish them with certainty.

HERRICK TO HARRIS.

New Haven, Oct. 19, 1841.

As you will of course need a description of the insect [Hessian Fly], I give you the following, which I made long ago, and which I now extract from a copy of my letter dated Jan. 10, 1834, to Dr. C. E. Hammerschmidt, of Vienna.

♀. *Antennæ corporis dimidii longitudine, porrectæ, moniliformes, teretes, verticillato-pilosæ,* 17–19 *articulatæ; articulus primus turbinatus, secundus globosus, sequentes ovati non pedicellati. Caput parvum; oculi magni, lunati, nigri, confluentes. Thorax gibbus, niger, politus. Abdomen fulvum, pilis atris; ovipositor roseus. Pedes elongati, filiformes, tarsorum articulus basalis perbrevis. Alæ atro-pilosæ, basi fulvæ, nervis tribus; primus, ab alæ origine ad marginem anteriorem paullo ultra medium recte tendit; secundus ab alæ origine ad apicem recte tendit; tertius obscurus (forsan spurius) ab alæ origine ad marginis posterioris medium flectus. Long.* 12 *poll.*

♂. *Antennæ fere corporis longitudine paullo recurvæ; articuli* 17–19 *subglobosi, pedicellati. Abdomen elongatum, griseo-pilosum. Pupa elongato-ovata, badia, glabra, undecim lineis transversis; articulus posterior sæpe bifurcatus. Long.*.12 *poll.*

Larva hyalina, duabus lateralibus lacteo-albarum nubilarum seriebus. Ovum hyalinum, fulvescens, lineare. Long. .02 *poll.*

I have an impression that in one of my recent letters I stated that the egg of the Hessian Fly hatches in about a fortnight after it is laid. If I have said so it is an error; it should be about four days. The period will probably vary somewhat with the state of the weather, but this is near the average.

In regard to the Wheat Moth of the Middle States I might have also referred to J. B. Bordley's Essays and Notes on Husbandry and Rural Affairs, Phil., 1799, 8vo, p. 591. He says "the moth-fly described by Duhamel was extremely numerous, common and destructive in every year," until about the year 1772, etc., p. 296. He gives no description of the insect. I am inclined to think we have it here; at any rate, on one occasion, several moths flew out of a parcel of heads of wheat which I had laid away and had accidently disturbed. I did not secure any of them, and have never seen any since. I have just referred to your paper on the barley insect, and am somewhat inclined to believe that your pupa was that of the veritable Hessian Fly; and that the parasite which some of them evolved was Say's *Ceraphron destructor*. I have planted barley in my garden this spring, and find that the Hessian Fly (which I have seen this spring) has no objection to laying eggs upon it, but she evidently prefers wheat. As we do not know of any other insect of habits like those of the Hessian Fly, is it unreasonable to suppose that the latter attacks barley in New Hampshire? I am by no means confident in this conjecture, and the difference in the situation of the larvæ obliges us perhaps for the present to believe that your barley insect is a different species from *C. destructor*, though nearly allied to it.

HERRICK TO HARRIS.

New Haven, Aug. 17, 1841.

Among the wheat which ripened in my garden, in July last, I have found a considerable number of minute reddish larvæ, such as I have seen in former years. They were within the glumes of the half-ripe and ripening grain, but they appeared to do no special mischief. They are small, the largest (and apparently full-grown) being only about one twentieth of an inch long. I have examined them very carefully with high magnifiers. From a comparison of the larvæ, I have little doubt that this belongs to some species of *Lasioptera* or *Cecidomyia*. What the parent insect is, I know not, but presume it to be one of those minute *Lasiopteræ*, which I have often seen in June, about sunrise, hovering around the spikes of wheat while flowering.

My barley was but little visited by insects. On a few stalks I found larvæ of the Hessian Fly. I have also seen between the sheath and culm, two other larvæ whose history is unknown to me, but which appear not much related to the Hessian Fly.

HARRIS TO HERRICK.

CAMBRIDGE, Jan. 14, 1843.

Hoping that you may be induced to favor me with some of your promised notes on my Treatise, and being particularly desirous at this time for some further explanation of Mr. Havens' remarkable statement respecting the transformation of the Hessian Fly, which, if true, I should be glad to be able to make use of in some observations on transformations that I am now drawing up for a lecture, I beg leave to call your attention to the statement of Mr. Havens, quoted on page 428 of the Treatise. "Whenever the fly has been hatched in the house, it always comes forth from its brown case, wrapped in a thin white skin which it soon breaks, and is then at liberty."

You are aware, I suppose, that the transformations of insects from the pupa to the imago, consists in some of a single, and in others of a double, moulting. Permit me, however, to name some examples of the course of transformation, illustrating these castings of the skin or skins.

The maggots of most flies become pupæ within the indurated maggot-skin, which then forms a puparium, or natural cocoon, for the insect; and which, if carefully opened a few days or hours before the last transformation, will be found to contain a real pupa, not greatly unlike the pupa of a beetle, having like the latter the legs and abortive wings unconfined. When about to come forth in the fly state, the inclosed insect breaks off the end of its puparium or old larva-skin, and at the same time divests itself of the thin and delicate pupa-skin, leaving the latter within the hardened puparium. This is an example of double moulting on assuming the winged state, for the insect sheds both its larva- and pupa-skins at the moment it appears as a fly.

Still more remarkable is the moulting of *Ephemeridæ.* When about to undergo its transformations, the pupa of an *Ephemera* crawls out of the water, and, after resting a while on some stick or fence, it throws off its pupa-skin and flies away apparently fully formed. Soon, however, it settles again, and then casts off another skin, exceedingly thin and delicate, which not only covered its whole body, but invested also its legs and filmy wings. Beetles, wasps, bees, and most hymenopterous insects, cast off only one skin, the true pupa-skin, when they take the winged form. The same is true of gnats, musquitoes, horse-flies, etc., which cast off only the single pupa-skin to become a perfected insect, having some time before moulted the larva-skin to become pupæ.

Is the Hessian Fly to be cited as an example of transformation like that of the *Ephemera*, or is it intermediate between that of the *Ephemera* and that of common flies? or, on the other hand, is it altogether similar to that of the latter, as described in my first example? In other words, does this insect come out of its flaxseed puparium in the form of an active pupa, and then cast its pupa-skin, in order to become a winged gnat? Or does it come out of the puparium in the form of a gnat, and then throw off a skin, like an *Ephemera*, before it can be said to have attained the perfect state? Or, finally, does it burst and extricate itself, at the same moment, from puparium and pupa-skin, leaving the latter within its puparium?

From a remark in one of your letters I infer that the latter kind of moulting does not occur to the Hessian Fly; but you have not stated what the precise change is, nor how we are to understand the statement of Mr. Havens.

HERRICK TO HARRIS.

New Haven, Feb. 21, 1843.

As regards the moulting of the *Cecidomyia destructor*, I must reply almost wholly from memory, for I am so much occupied and interrupted that I cannot make a thorough examination of my voluminous observations. I think, however, that I shall not state anything about the matter which is not substantially true.

The Hessian Fly mother lays an egg on the young wheat plant; in a few days it hatches, and the larva crawls out of the fine pellicle, which is left *in situ*. Here is one covering thrown off. After feeding on the juices of the plant, the larva becomes plump and tense, and in process of time turns brown. In two or three weeks after this change of color the animal within becomes entirely detached from the old larva-skin, and lies a motionless grub. Here is another covering thrown off. The process of growth goes on, and by and by, on opening the leathery maggot-skin (now a puparium) you find the pupa so far advanced that some of the members of the future imago are discernible through the scarf which envelops and fetters it on all sides. In due time this scarf splits on the thorax, and the imago works out, literally,—and, as I suppose, at or about the same time forces the puparium, and comes forth in full-winged maturity. In the entire life of the insect, then, there are three moultings.

I recollect distinctly finding among my wheat stalks one bearing a pupa of the Hessian Fly; and attached to one end of the puparium (and, I believe, partly engaged in it) was this scarf-skin; showing that the emergence from the puparium must have been somewhere nearly contemporaneous with the disengagement from the scarf. A paper lies before me containing memoranda made May 12, 1837, of which I will give an abstract.

"On looking over culms of wheat from my garden, which ripened last July, and were taken into the house in April, 1837, I found a puparium of the Hessian Fly; began to cut it open, and found within a Hessian Fly nearly matured. Opened only the anterior part of the puparium; but the animal soon squirmed itself out, enveloped in a thin scarf. The puparium was left entirely clean; of course the thin skin, or exuvia, was yet upon the animal. The antennæ, legs, eyes and wings, as seen through this covering, were black. The abdomen was composed of eight annuli, besides a small appendage, mostly of an internal red color; each annulus sparingly clothed with dark hairs. The animal worked its abdomen back and forth, and in about twenty minutes the posterior part of the abdomen and the ovipositor could be clearly seen within, detached from the exuvia. The only split in this scarf-case was on the thorax."

I am somewhat puzzled to understand how the Hessian Fly can make its way through the stout leathery puparium. Those near the foot of the stalk are battered and shattered by the weather, and are easily pierced, but those higher up seem to me too firm to be forced by so feeble an animal. In these latter cases another difficulty much more serious lies in the way, — the sheath of the leaf must be pierced; this is often quite hard and firm. This theoretical difficulty is perhaps never a practical one, for the parasites take good care of all such cases.

HARRIS TO HERRICK.

CAMBRIDGE, MASS., Sept. 15, 1847.

Being very desirous of comparing Miss Morris's *Cecidomyia* with recent specimens and the genuine Hessian Fly, I take the liberty of reminding you of your promise to obtain for me if possible some of both species for examination.

There are discrepancies in the published descriptions of the

Hessian Fly which ought to be explained or removed. The first and most important is in the number of the joints of the antennæ. These ought to be the same in all specimens of the Hessian Fly, or in all specimens of the same sex; for I can conceive and admit that the male may have one joint or two joints more than the female.

In Elsworth's Report on Patents, 1845, p. 162, you state that "the antennæ consist each of from fourteen to seventeen oval joints, besides the basal joint, which appears double"; that is, the antennæ are sixteen- to nineteen-jointed.

In your letter to me, dated June 7, 1841, you stated that the antennæ of females as well of males were "seventeen to nineteen articulate,"—"*articulus primus turbinatus, secundus globosus*," etc., noticing the difference in the form of the following joints in the two sexes.

Dr. A. Fitch, in his account of the Hessian Fly, p. 41, states that the antennæ are "composed of sixteen joints"; "the two basal joints are globular, and compact or not separated by an intervening filament, and exceed the following joints in diameter." This is given in his description of the female. He does not say that the number differs in the male. His figure of the ♂ shows sixteen joints; that of the ♀ fifteen joints. If in this case the basal is to be counted as two joints, the male, according to Dr. Fitch's figures, will have seventeen and the female sixteen joints to the antennæ.

Say does not give the number of joints in either sex (see Journ. Acad. Nat. Sc., I, pp. 45, 46). In Lesueur's rather coarse drawing (ibid, opposite page 64), the enlarged figures of the antennæ (3, a and b) give fifteen joints in each sex; probably the double basal joint was omitted. The figures 2 a and b also show only fifteen joints in each sex.

Have you observed a greater number of joints in the antennæ of the males than in those of the females? Do you know whether Dr. Fitch has noticed the like difference? or is the difference in his figure accidental? In insects so small and delicate, a joint or two of the antennæ may easily be lost or may be overlooked. Taking a number of specimens of each sex, what is the greatest number of joints observable in the antennæ of each sex? This will best show the normal number for each. Have the males ever more than nineteen, counting the basal joints as two? Have the females ever more than eighteen, including the two conjoined basal joints? Have the latter indeed ever so many as eighteen? Until these points are positively determined and settled we cannot have a perfectly accurate specific description of the Hessian Fly.

In your description of the female, in Elsworth's Report, p. 162, you state that the head, eyes and thorax are black; abdomen tawny red, furnished irregularly with many black hairs; ovipositor rose-red color; legs pale red, covered sparsely with black hair; males less black (than the females).

In your manuscript description (before named) you say of the ♀:—"*thorax niger, politus; abdomen fulvum, pilis atris; ovipositor roseus; alæ atro-pilosæ, basi fulvæ.*" ♂. *abdomen elongatum griseo-pilosum.*" Dr. Fitch, p. 41, says of the ♀: "head black throughout; thorax black, scutel of same color and slightly polished, the suture surrounding it sometimes fulvous; poisers dusky; abdomen black above, more or less widely marked at the sutures with tawny fulvous and furnished with numerous, fine, blackish hairs; ovipositor rose-red; wings slightly dusky and fulvous at their insertion into the thorax; legs pallid brown, tarsi black, femurs paler at their bases." ♂; "abdomen of a brownish black color, more or less widely marked at the sutures with pallid fulvous or smoky whitish lines. In all other points the male coincides with the female" (in color).

Say's description is: "head and thorax black; wings black, fulvous at base; feet pale, covered with black hair." ♂; head black, thorax black, glabrous, polished; scutel color of thorax; wings ciliate, blackish, the fulvous color of the base sometimes extended upon the nerves; thighs fulvous at base; poisers pale; breast sometimes fulvous; abdomen brownish. ♀; abdomen fulvous, with a dorsal and ventral black vitta, widely interrupted by the sutures.

You observe here some differences, particularly in the color of the abdomen of the female, yours being described as tawny-red; Fitch and Say's as black above, etc.

Miss Morris describes the female of her species as quite black, or blackish-brown, and not like Say's female. The male, on the contrary, she states to agree with Say's description in every particular. I hope you will give me a description of the species which you recognized as similar to Miss Morris' specimens, unless you can succeed in obtaining living specimens.

HERRICK TO HARRIS.

New Haven, May 30, 1848.

During the first year of my entomological studies I gradually came to the conclusion that the number of joints in the antennæ of the Hessian Fly, and also of several others of our *Cecidomyiæ* could not be depended upon for constancy; and ultimately I made it a rule, whenever I met with a Hessian Fly, at once to set down the number of the joints in the antennæ. Many of these data I must have consulted when I wrote the paper in the Patent Office Report issued in 1845. Special attention was given to those cases where I saw the insect in the act of evolution from its thin membranous exuvia, for I thought it probable that many of those found in the field had suffered some mutilation in the antennæ.

I copy now from almost the first paper which meets my eye.

"May 13, 1833. *C. destructor*, male, evolved this morning; I saw him before more than half was extricated from the membranous bag which envelops him. When first evolved the color is much paler than a few hours after; his thorax was red, his genital organs quite distinct, antennæ 17-jointed, besides the basal.[1] A very large specimen, rather larger than any female I have yet seen. Joints of antennæ rather stouter at top than bottom, not globose." Then follow various remarks about head, abdomen, etc.: "When at rest the wings extend beyond the abdomen one third of its length, of just about the size of Say's fig. 1. His figure errs in making the abdomen extend to the tips of the wings. Abdomen of a dull clay yellow," etc.

"May 13. Another male evolved. One antenna has sixteen joints besides the basal, and the other has fifteen joints besides the basal, but the terminal one (in the latter) is rather larger than usual." "When the antennæ of the male are perfect, each joint has two sets of hairs. Each joint in fact consists of two, the upper one globose, and rather larger than the lower, which is rather paler." (According to my recollections there is only a slight stricture visible here with a high magnifier, but indicative of a tendency to division, or perhaps rather of the union of two joints. And in some species of *Cecidomyia* we find this separation clearly carried out.)

"May 18. A male evolved; both antennæ have sixteen joints besides the basal.

"Sept. 6, 1833. On opening a box containing stalks with pupæ collected from wheat in garden, July, 1833, I found a male Hessian Fly, and three very small Hymenoptera, etc." "Antennæ have seventeen joints besides basal." "I have no doubt that this Hessian Fly came from a pupa of last fall," etc.

Sept. 9 (doubtless 1833). "The fly ♀. Posterior part of each joint of abdomen naked." "Antennæ dark red," etc. "Of sixteen joints besides basal; ultimate longer than penultimate."

"Sept. 23, 1833. ♀. Antennæ about half the length of body; fourteen joints besides basal; the terminal joint twice as long as the preceding." (This looks like an unsuccessful conatus to form another joint.)

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[1] "Basal" means here, and beyond, what I often called "bibasal"; the joint sessile on the head, and apparently double. Some persons would consider it, and perhaps properly, as making two joints.

"June 5, 1833. Found a Hessian Fly ovipositing." "Fifteen joints (in antennæ) besides the basal; the last no longer than the penultimate. Query: When the terminal joint is long, is it not really double?"

"June 3, 1833, 2 P.M. Clear day, not very warm. Found a Hessian Fly ovipositing upon the leaves of the wheat, most of it 'heading out.' I was somewhat surprised at it, as I supposed that the spring crop of Hessian Flies had long ago come out, laid their eggs, and died. I secured it, but found nothing peculiar about it." "Had fifteen joints (in antennæ) besides the basal, which last was plainly biarticulate."

"June 7, 1833, 2 P. M. Found a male and female Hessian Fly on wheat in the garden; secured them. The male had sixteen joints (in antennæ) besides basal; terminal joints larger than preceding and possibly biarticulate. The male is fully as long as, and I think somewhat larger than, the female." "The female has fifteen joints besides basal." "Confined them both in one vial. The female has laid many eggs (about fifty) upon the sides of the vial and cork." Then follow divers notes on the changes of the egg.

"June 13. Several of the eggs hatched. The larvæ when first hatched resemble the eggs in size, shape and coloring, and have some little activity; *i. e.*, crawl about rather sluggishly. Nothing is left of the egg except a very thin, transparent membrane, entirely devoid of color. Whatever of color the egg had is carried off by the larva."

Mem. without date. "♀. Antennæ in one, sixteen-jointed besides bibasal, but the last two are connate.

"♂. Antennæ rather more than half as long as body; one had sixteen joints besides bibasal."

I may have other memoranda touching this point, but those which I have copied above will, I think, justify my statement in the Patent Office Report; and they show that the number of joints is not constant, and that at any rate this character ought not to be depended on for discriminating the species.

I cannot reply just now to your questions respecting the color of the abdomen in the ♀. According to my recollection the color is due chiefly to the mass of eggs within, and varies much in different individuals, and so does the hairy clothing of the abdomen.

HARRIS TO HERRICK.

CAMBRIDGE, Sept. 20, 1852.

I am sorry you could not send me specimens of Say's *Ceraphon*; those received from Dr. Fitch differ somewhat in color from Say's description;—but if otherwise the same cannot belong to *Eurytoma*. My article is partly in print already, and cannot be materially altered now. I have thought best to retain Mr. Tighlman's statement because it is so full and circumstantial, and withal of an early date. I have seen the Hessian Fly in the flaxseed state, and have raised therefrom specimens of the fly, and so far, can speak from personal observation. I have also several other species of *Cecidomyia*, several of which have been raised from the larvæ. Including the Hessian Fly, there are now four species, with whose history and transformations I have become acquainted from personal observation. These are *C. destructor*, *C. salicis*, *C. tritici* and *C. robiniæ.* All of these agree essentially in their characters in the winged state. There is no genus, except *Cecidomyia*, to which I can satisfactorily refer them; and I am at a loss to know what the characters of *Cecidomyia* are, if not such as are found in these insects. In that section of *Lasioptera* which has the first tarsal joint short, the antennæ are not surrounded with whorls of hairs, one of the essential characters of *Cecidomyia.* On revising your valuable letters I found that you had noted the condition of the Hessian Fly after it had taken the flaxseed form, and before it had any trace of the wings and limbs of the fly about it. You spoke of its lying within its flaxseed case "a motionless grub." Mr. Worth mentions something similar. He says that soon after the change of color, if the insect be gently rubbed with the finger, the flaxseed skin may be detached, and the animal within will be disclosed in the maggot form, or words to this effect. Putting these facts in comparison with what I had myself seen in the other species, I was led to the conclusion that the condition of the insect between that of the active or feeding larvæ and the fully developed pupa, in which it still retained the larva form, could not properly be called the pupa state. I have not come to this conclusion hastily, or without fully considering all the circumstances attending the transformations of the four species above named. *C. salicis* retains the larva form till a few days before the evolution of the fly, and it is converted to a mature pupa without casting off or detaching itself from a larva skin. The same occurs with *C. robiniæ*. *C. tritici*, in ninety-nine cases out of a hundred, casts off one larva-skin before it leaves the wheat ears, then still retaining the larva form, it descends to the ground and penetrates a little way below the surface, where it remains unchanged till a few days before the fly is disengaged. The pupa state is very brief, and the form of the insect in this state is similar to that of others, and is assumed without again casting off its skin. In a very few cases, the larva does not cast off its skin till just as it is entering the earth. You seem to agree with me that the matured pupa is a different thing from the larva, in form; for it shows the rudimental members of the fly beneath the "scarf" skin of the pupa. You also have observed that the Hessian Fly insect retains the form of a larva after its flaxseed skin has become detached from its body. These two important points you have the credit of making known before they were discovered or announced by Dr. Fitch. Whether "the insect may be said to enter on the pupa state" (of course immature pupa state, must be understood) as soon as it has assumed the flaxseed form and color is a mere matter of opinion, and is of little consequence so long as we understand what is the actual form of the insect included in the flaxseed shell. It wears the form of a larva, whether you call it one or not. So the *C. salicis*, *C. robiniæ* and *C. tritici*, after the larva has ceased eating, has become quiescent, and is waiting the development of the limbs of the fly, before these actually become visible,—are all, during this state, exactly in the condition of the Hessian Fly insect after assuming the flaxseed form externally,—and during this period they all retain the larval form. The mere name given to the insect during this period will not change the facts. The caterpillar of a butterfly, when it has come to its growth, ceases to eat, seeks a suitable place and then suspends its body. It remains hanging awhile, still wearing the form of a caterpillar, and then becomes a pupa by casting off its caterpillar skin. The condition of the insect between the active state of the caterpillar and the pupa state is exactly analogous to the condition of the Cecidomyians during the period above mentioned. The difference between them is this, — the caterpillar casts off its skin to take the form of a pupa; the Cecidomyians do not cast off their (apparent?) larva skins to take the form of a pupa. By the "form of a pupa" you will understand that I mean a form different from that which the insect previously had, one in which the members of the future fly are more or less distinctly visible, beneath the skin that envelops them.[1] This peculiarity in the transformation of the Cecidomyians, described in my last letter, I should not have credited if I had not seen it myself. It was a suspicion that the transformation of these insects had some peculiarity, that led me, some years ago, to question you so closely relative to the moulting of the Cecidomyians. According to my present views,—the point of time when "the insect may be said to enter on the pupa state" is the moment when the limbs of the future fly become visible; this occurs only a very few days before the evolution of the fly, as I have myself witnessed. Previously to that moment the insect appears in the form of a larva, a mere maggot, without a vestige of wings, antennæ or legs. The conversion of the insect from this form to that wherein the wings, antennæ, and the legs are visible, is effected (by the growth of these parts) without a casting off of the skin, as before stated. The Hessian Fly is said by some to undergo a coarctate transformation, or rather to have a coarctate pupa. This is true in one sense, but not in the sense commonly so understood by entomologists. It was this very difference that so much puzzled me years ago. All this time you were fully aware of it; but owing to our not making use of the same phraseology, you failed to communicate your discoveries to me fully. It was only after I had examined the puparium of the Hessian Fly, and the included pupa, and had compared the latter with the (mature) pupa of other species, and had witnessed how the latter came into this state, that I saw through the whole matter, and then discovered from various passages in your writings, that you had seen the same long ago. I have been anxious to give you full credit for every item of information derived from you and contained in my work. At the risk of being tedious, I have here taken some pains to make myself understood now, and have had to write amidst various interruptions. My object is not to controvert what you may have stated as to the time when the Hessian Fly "may be said to enter the pupa state," but to show that I understood that there is a period, a long period, during which the insect included within the flaxseed shell has the form of a larva and "lies a motionless grub" as you have stated. Dr. Fitch calls the insect, during this period, a dormant larva; perhaps you would call it an immature pupa.[1] A mature pupa it certainly is not, till it is provided with limbs, etc. The wheat-fly (*C. tritici*) during this same period has likewise the form of a larva; but instead of remaining dormant all the while, it actually possesses the power of locomotion; and though unprovided with legs, crawls down from the wheat ears to the ground, and burrows in the earth. Can it be in the pupa state while doing this? I trow not. It was this fact with others that induced me to change my opinion regarding the time when the insect may be said to become a real pupa.

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[1] The true or mature pupa is that condition of the insect in which the limbs, etc., of the future fly are developed but still remain in an immature state, each separately inclosed in a portion of what you call the scarf-skin, just as the fingers of the hand are in a glove. This kind of a pupa is said to have "the limbs free" because they are not (as in the Lepidoptera) soldered to the breast.

In the Patent Office Report you allude to Raddi's account, as you do in your last letter; but have not stated where it is to be found. For this reason I have not referred to it. Dr. Fitch seems to have made a strange geographical mistake about the places where the Hessian Fly was observed in Europe, as stated by Köllar. Altenburg is in Hungary, at the confluence of the Leith and Danube, forty miles south-east of Vienna, and seventeen south of Presburg. Weikendorf is in Austria, sixteen miles north-east of Vienna: the former more than four hundred, and the latter above three hundred and seventy-five, miles from Hesse Cassel.

Did I tell you that *C. salicis* is nearly twice as large as the Hessian Fly? The magnitude of the larva makes it an excellent subject for observation of the (to me) extraordinary peculiarities in the transformations of the *Cecidomyiæ*. These peculiarities seem to be wholly unknown to European entomologists, and are not distinctly stated even by Dr. Fitch. With the exception of these insects, there is no instance on record of an insect passing from the larval to the pupal form without casting off or becoming detached from the skin with which its body was immediately previous thereto enveloped. The moulting of the wheat fly maggot and the detaching of the flaxseed skin by the Hessian Fly insect cannot be cited in proof that these insects conform to the general rule; because even after these processes, they still retain the same shape that they had before,—namely the shape at least of a larva; and the skin then investing the body is not thrown off till it is converted to a (scarf) pupal skin, and is cast in order to develop the perfect fly.

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[1] I was disposed formerly to consider the insect in this stage as analogous to what the French writers term *boule allongée*; but the active condition for awhile of the wheat-fly larva, after its feeding state is over, and after it has moulted its skin, has induced me to change my opinion. Moreover in *C. salicis* and *C. robiniæ* there is no moulting at all till the fly is developed.

CORRESPONDENCE

BETWEEN

THADDEUS WILLIAM HARRIS

AND

JOHN LAWRENCE LECONTE.

CORRESPONDENCE.

HARRIS TO LECONTE.

CAMBRIDGE, Jan. 23, 1849.

Blethisa quadricollis, when placed by the side of my species, proved to be obviously distinct from the latter, for which, therefore, my name of *B. americana* remains good. The distinction was not only plainly perceptible to myself, but was immediately recognized by Professors Agassiz and Pierce, to whom the insects were shown. I know not what standard of measurement Prof. Haldeman used, in making his *B. quadricollis* to be seven and one half lines long and three wide. I use the English inch, divided into tenths or hundredths, and in measuring the length exclude the mandibles. My female *B. americana* measures six tenths of an inch in length, and not more than one hundredth of an inch less than three tenths of an inch in its greatest width. *B. quadricollis* I make to be also six tenths long, but only two and one half tenths broad. There is not the slightest vestige of a tooth on the under side of the anterior femora in *quadricollis*; neither is there any in the female of my *americana*. I may add, what you probably have observed, that *quadricollis* is a female, and that it has the anterior femora incrassated, as in the female *americana*. The *quadricollis*, compared with the female *americana*, wants the cupreous lustre of the latter; is a more slender insect; the head is narrower; the thorax not so wide and more contracted behind the middle, is destitute of punctures on the basal edge, and the basal foveæ are smaller; the coleoptra are more prolonged behind, and not so obtusely rounded; the external striæ near the tip are not so much angulated, and there is no vestige of the obsolete impressed fovea which is found adjacent to these angulated striæ in my species; the striæ are not so deeply impressed, and the little punctures in them want the decidedly shining, brassy color of *B. americana*; the large, impressed foveæ are similarly placed, but are smaller and not so deep.[1]

Upon examination and careful comparison of your typical *Notiophili*, the following results were obtained:—

1. Your No. 422 is the true *porrectus* of Say. Herbst's description of *æneus* applies also well enough to it; but his figure (bad enough, doubtless, and probably incorrect) is widely different.

2. Your specimen from Lake Superior is the *semistriatus* of Say, agreeing exactly in size, form, color, and sculpture with my specimen from Pennsylvania. Your 421 is also identical with *semistriatus*, differing from my typical one in being rather smaller.

3. Your 423 and the specimen ticketed *novemstriatus*, constitute but one species; not the *semistriatus* of Say, but the species which I long ago named *quadrifoveatus*, and which by that name I have distributed among my correspondents in Europe. It is the analogue of the European *biguttatus*, from which, however, it differs in many obvious characters. You will see that it has near the tip of each elytron an oblong fovea, which, taken with the ordinary one before the middle of each elytron, suggested the descriptive name *quadrifoveatus*. I regret that such

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[1] Having examined more than a dozen specimens of *B. quadricollis*, I may say that the differences mentioned in the above letter are not specific, but merely individual. At the time the comparison was made by Dr. Harris, but one Lake Superior specimen of *quadricollis* was known; since then it has been found not unfrequently in Northern Illinois, Wisconsin and Michigan. [J. L. L.]

a name should have to yield to *novemstriatus*, which is not characteristic of the species. This is by far the most common species, though confined to certain localities. I have examined specimens from New Hampshire, Vermont, Massachusetts, New York, Pennsylvania, North Carolina, and Alabama. The base of the antennæ and the tibiæ vary in being more or less tinged with brown, and consequently in being lighter or darker in different individuals. In some of my specimens there is a faint and almost obsolete, rufous, oblique spot near the tip of each elytron.

Having examined a good collection of European *Notiophili*, I feel confident in pronouncing our American species distinct therefrom. Some years ago I drew up the following tabular formulæ of the species: —

Each elytron with	one abbreviated stria near the scutel;	
	dorsal striæ obsolete behind the middle;	
	legs entirely rufous,	1. *porrectus* Say.
	legs black,	2. *borealis* Harr.
	dorsal striæ continued to the tip,	3. *americanus* Harr.
	two abbreviated striæ near the scutel;	
	each elytron with one foveole,	4. *semistriatus* Say.
	each elytron with two foveoles,	5. *quadrifoveatus* Harr.

N. borealis and *americanus* appear to be unknown to you, and I regret that I have not now any duplicates of them[1]. I hope, however, to get *borealis* next July or August, when I propose going to the White Mountains, where the species has been found by Dr. Pickering and Mr. Tuckerman.

Considering how much the synonymy of our species has been confused, I venture to suggest whether it would not be better to name the five foregoing species thus: 1. *æneus* Herbst;

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[1] This *N. borealis* was described by me under the name *punctatus*; it scarcely differs from the Asiatic *sibiricus* Motsch. I think *americanus* is merely an individual variation. No. 5 is the most abundant species, and agrees with Say's description and I have regarded it as *semistriatus*. No. 4, by Dr. Harris's comparison, is my *confusus*, and differs by the more coarsely punctured elytral striæ. [J. L. L.]

2. *borealis*; 3. *striatus*; 4. *semistriatus*; and 5. *americanus* (rather than *novemstriatus*). The fifth species being the most widely diffused, seems to merit the name *americanus*, rather than the third, which is very rare, and appears to be local; and I am perfectly willing to drop the name *quadrifoveatus* if I have your consent also to drop *novemstriatus*.

Last August I went to Blue Hill to catch *Cicindela Hentzii*. I could find only five specimens. I have again compared the species with others, and conclude that it is a genuine species, intermediate in markings between *punctulata* and *rufiventris*, but with far more distinct spots than either. Like the former it has a distinct subsutural row of ocellated punctures, visible even to the naked eye. Compared with *rufiventris* the thorax is more nearly quadrate, is almost straight at the sides, and the punctures on the elytra are smaller and less distinct,—besides the difference in color and markings. If *C. Hentzii* and *C. rufiventris* constitute but one species, then *C. rufiventris* should be the variety; and other individuals, having the elytral spots larger and more distinct than in the variety, but smaller and less clearly marked than those of *Hentzii*, ought to be found. Such never having occurred, and other considerations moving me, I go back to my first opinion that *C. Hentzii* is a genuine species, distinct from the southern *C. rufiventris*.

In adverting to the confusion of the synonymy of the *Notiophili*, . . Say himself began it by confounding his *semistriatus* and *porrectus* under one name; and Dejean has made the matter worse, by referring all the American to European species, which evidently he had not carefully studied. In fact the European *Notiophili*, as characterized by Dejean, require revision just as much as the *Amaræ*.

Have you not been led to mistake Say's *Notiophilus semistriatus* on account of the name? If you will look at Say's description, you will find that the name was not intended to denote the want of elytral striæ behind the middle, but the want of them near the sutural striæ. In fact, the second and third striæ are wanting, and thus leave on each elytron, a wide or "dilated, smooth, polished, longitudinal, continued space" as expressed in Say's description.

Two of my five species have this wide, impunctured, polished, longitudinal space near the sutural stria or row of punctures; one of them being the true *semistriatus*, and the other my *quadrifoveatus*. One of them has two abbreviated striæ near the scutel; the other three species have only one punctulated stria near the scutel, one only of the longitudinal striæ being wanting in them; *semistriatus* has only one impressed point on each elytron, and the tibiæ are dark rufous; *quadrifoveatus* has two impressed points on each elytron, one before the middle and the other near the tip, and the tibiæ are darker, being decidedly brownish; *quadrifoveatus* is somewhat smaller than *semistriatus*, and ordinarily has about nine striæ on the head, while *semistriatus* ordinarily has only seven. This last character, however, is not much to be depended on. I am inclined to think that the type of your *novemstriatus* may be my *quadrifoveatus*; but I shall be glad to examine your specimens of this genus, as well as your *Blethisœ*.

HARRIS TO LECONTE.

Cambridge, Oct. 13, 1851.

You ask me what differences I find between *Cicindela rugifrons* and *C. unicolor*. The insect that I refer to the *unicolor* of Dejean, Vol. I, pp. 52, 53, appears to me to be distinct from the nearly or quite immaculate varieties of *rugifrons*. Numerous specimens and varieties of the latter I took on the sands beyond Mt. Auburn in Watertown, in August, 1826, and subsequently there and at Chelsea Beach, and have seen others from Martha's Vineyard. A practiced eye would at once separate the southern *unicolor* from all those varieties. And here let me remark, incidentally, that I never saw or heard of a black variety, or of the obscure, in either of these localities. It is easier to perceive than to describe the difference between these varieties of *rugifrons* and the southern *unicolor*. The latter was taken at St. John's Bluff, East Florida, in February, 1838, by my lamented friend Mr. Edward Doubleday, who kindly presented two specimens to me. The *unicolor* referred to is absolutely immaculate, not a vestige of white being upon the elytra. The color is more blue than green, with a beautiful purple or reddish reflection on the elytra. Size smaller than *rugifrons*; thorax more smooth; elytra more convex, and more rounded at the humeral angles and tip. Head rather smaller than that of *rugifrons*, etc. Indeed, I cannot amend Dejean's description, which seems well to characterize my specimens, except that he does not notice the purplish reflections of the elytra. The whole surface has a smoother and more satiny lustre than *rugifrons*. All these, I admit, are on paper slight distinctions; but were you to see the specimens side by side with *rugifrons*, I think the differences would strike you as they did both Doubleday and myself.

Of *tortuosa* I have four specimens, also taken by Mr. Doubleday in Florida, and no two of them are marked exactly alike. There is some disparity in size in the two sexes, but the males are not proportionally much narrower than the females. They are more densely punctured than *punctulata*, but the punctures are not confluent. In one ♂, the terminal lunule consists of a nearly straight white line along the hinder slope of the elytron, slightly enlarged at the tip. In a female, this same line is a little enlarged at both ends. In a second male, the line is enlarged at tip and refracted at a right angle from the other end, and almost united there with a white spot. In the other female the union is complete, the terminal line forming a kind of hook at the anterior extremity. The thorax, I should think, might be called *subtilissime rugoso*; perhaps you would say *evidenter rugoso.* These specimens do not exactly agree with any of your descriptions, and they certainly are all of one species, and were all taken in one locality.

I was much struck with your suggestion regarding *C. Hentzii* and *C. rufiventris*, and almost tempted to consider them as constituting but one species. I want to see more specimens of *rufiventris*, however, before adopting this conclusion. Of all those of the *Hentzii* that have passed under my observation (and I suppose that I have seen every one that has been taken, amounting to near a hundred in all), I never yet saw any one so obsoletely characterized as *rufiventris*; nor, of the latter, any one so completely marked with lunules and band as *Hentzii.* Should any specimens occur intermediate between the two in characteristic markings, and also in size (for our *C. Hentzii* is, I believe, uniformly larger than *rufiventris*), it may help to settle all doubts on the subject of identity. Both being, I believe, mountain species, others should be looked for on mountain ranges between North Carolina and Massachusetts, and on porphyritic and sienitic rocks, in such localities. If in the end the two should be considered as forming only one species,—then, *C. Hentzii*, being the most perfectly marked, must constitute the type, and *C. rufiventris* the variety; but I am not yet prepared to sink either of them to a synonym in nomenclature. Mr. MacLeay has somewhere remarked that he did not see any difference between permanent varieties and species. There is something for consideration in such an opinion even if we do not adopt it to its full extent.

Allow me to add a criticism on *Cicindela trifasciata* of Fabricius, to which I find you referred *tortuosa* of Dejean. Of *trifasciata*, Fabricius says:—"*Habitat in America, in Italia paullo minor. Corpus supra obscurum, subtus æneo nitidum. Labium album. Elytra strigis tribus, prima abbreviata, lunata, secunda flexuosa, tertia apicis.*" Ent. Syst., I, 177, No. 33. Please here to observe two things; first, that the intermediate band is described as *flexuosa*; and second, that a smaller variety (or species) is found in Italy. Now what Fabricius meant by *fascia* or *striga flexuosa* may be discovered by other descriptions of his, as of *Cicindela flexuosa* and *lurida*. *C. flexuosa* described from Olivier, who has figured it (as well as *trifasciata* and *lurida*), has the intermediate band irregularly bent, as in *C. vulgaris*. See Olivier and Dejean, Iconogr., I, pl. v, fig. 5. So also *lurida* has a nearly similarly formed, intermediate band; and in both of these Fabricius describes it as "*flexuosa*." The shape you will perceive, therefore, is very unlike the tortuous band of *tortuosa*. Secondly, the American *trifasciata* has its representative in Italy, according to Fabricius. Illiger considered the Italian one to be *sinuata* "without any doubt," and this has the intermediate band angular and recurved, also unlike that of *tortuosa*.[1]

Therefore upon an examination and comparison of the Fabrician and Olivierian descriptions and figures, I have come to the conclusion that the *tortuosa* of Dejean is not the *trifasciata* of Fabr. For the right understanding of the Fabrician descriptions I find it important to refer to the works which Fabricius published before his Systema Eleutheratorum, as they often contain additional remarks that are not embodied in the last.

HARRIS TO LECONTE.

CAMBRIDGE, Dec. 6, 1851.

Among the insects collected by Prof. Hentz in North Carolina, there were numerous specimens of a *Stenocorus* (*Elaphidion*), allied to the *putator* of Peck, as also a few of the latter species. They were intermixed, but I had no difficulty in separating the species, notwithstanding their similarity and their varieties. The southern and more numerous species was generally rather larger than our *putator*, the glabrous tubercules and line on the thorax more distinct (in *putator* often entirely wanting); but they were especially distinguished by the spines on the antennæ, which were much larger, longer and more unequal in length, and by the aculeated tips of the elytra, the outer spine being much longer than the inner, while in *putator* they are equal. I have always supposed that the greater part of the American insects found in European collections in the time of Linnæus, Fabricius and Olivier were obtained from the Middle and Southern Colonies or States; and am not aware that there were any collectors in New England who transmitted insects to Europe at that time. Hence, in the case of nearly allied species of New England, and of the States farther south, I have considered it more likely that the former would be undescribed than the latter. For such reasons I have marked the southern *Stenocorus* above referred to as probably the *villosus* of Fabr., and the *mucronatus* of Say; leaving the *putator* to Peck alone, though confessing it was possible it might be identical with *villosus* Fabr. I cannot believe that I have mistaken Peck's insect, having raised numerous specimens from the larvæ found in the cut-off branches of the oak. I have one of these original specimens still left, and will send it to you if you want it. Your description of *mucronatum* applies best to the southern species, which is not found in Massachusetts. Your *villosum*, to which you refer *putator* as a synonym, seems to be our Massachusetts insect. But are not *villosus* Fabr., and *mucronatus* Say identical? Please look into Fabricius again and see what he says of his *villosus*.

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[1] Some authors suppose that the Italian *trisignata* Ill., is the same as the Italian variety of *trifasciata* Fabr.; the intermediate band of *trisignata* is also unlike that of *tortuosa*, and represents that of *hirticollis*.

HARRIS TO LECONTE.

CAMBRIDGE, Nov. 22, 1852.

In regard to *Carabus externus* Say,= *Calosoma longipenne* Dej., you remark "*propter corpus apterum*," etc. Dejean says, "*il y a des ailes sous les élytres.*" The latter is certainly true of a pair in my collection, both of which have wings. On other grounds I believe you are right in restoring the insect to the genus *Carabus*, and I expressed the same view in a letter written to one of my correspondents fourteen years ago. From an examination made at that time of numerous species of *Carabus* and *Calosoma*, I came to the conclusion that none of the characters by which these genera have been distinguished are constant; and that either the two must be combined, or else many new genera, more strictly and artificially defined, must be instituted. I came to the same conclusion concerning *Cychrus*, *Scaphinotus* and *Sphœroderus*, as you may gather from my paper published in the Boston Journal of Natural History.

Calosoma scrutator and *Carabus sylvosus* are indeed very distinct from each other in what have been considered generic characters; but there are numerous species that may be placed between them, showing a regular gradation of characters from one to the other.

Are you aware that *Dicœlus purpuratus* of Say is nothing but an old and faded specimen of his *D. violaceus*? Such is the fact. He himself seems to have had some misgivings about the species; for he did not describe and figure it with *D. violaceus* in his American Entomology.

I follow Latreille in arranging my *Carabidæ* thus: 1. *Truncatipennæ*; 2. *Bipartiti*; 3. *Quadrimani*; 4. *Simplicimani* (*Feroniæ* Dej.); 5. *Patellimani*; 6. *Grandipalpi* or *Simplicipedes*; and 7. *Subulipalpi*; believing this to be a more natural order of the groups than any since proposed. It appears to me, moreover, that *Platynus* (including *Agonum* and *Anchomenus*) should go with the *Patellimani* rather than with the *Simplici-*

mani; and I do not see the propriety of removing *Patrobus* from a near connection with *Calathus* and *Platynus*, to place it where Kirby has put it, near to *Blethisa*, etc.

Dejean was not acquainted with the male of his *Metrius contractus*, the only species he had examined. I think he was wrong in putting it with his division of *Simplicipedes*. The tarsi of the males in this genus show that they should go among the *Patellimani*. The palpi are almost exactly like those of *Dicælus*; the short antennæ remind you of those of *Panagæus*; the emargination of the tibia also removes the insect even from the neighborhood of *Nebria*, etc. It is, in fact, one of those insects which serve beautifully to connect the *Patellimani* with the *Grandipalpi*. Artificially, it will come between *Eurysoma* and *Panagæus*, for it has a bifid tooth in the emargination of the mentum, two dilated joints (the second much smaller than the first, but covered beneath with the same kind of brush) to the first pair of tarsi in the males, and the last joint of the palpi subsecuriform (as in *Dicælus*, *Chlænius*, etc.). Artificially I say it will come between these genera, but I conceive its natural place to be near to *Oodes*, *Rembus* and *Dicælus*, and especially near the latter.

HARRIS TO LECONTE.

CAMBRIDGE, Nov. 29, 1852.

Are you aware that our big *Buprestis virginica* is the true *B. Mariana* of Linnæus? Such is the fact, as you will discover on consulting Linnæus' Museum Ludovicæ Ulricæ Reginæ, where it was first described.

I am glad to be able to set you right in one instance where you regret having changed one of Say's names,—that of *Pœcilus chalcites*. The change was unnecessary; and Germar's *Pœcilus chalcitis* (not *chalcites*) is of later date than Say's *chalcites*.

The Transactions of the American Philosophical Society were published in parts. The first part of the second volume of the new series, containing Say's *Carabici* and *Hydrocanthari* was printed and published in 1823. The covers of the parts had a printed title on the side, with the date. Unfortunately this was not repeated in the pages of the text, and when the parts came to be bound, there was nothing to show that one half of the volume had actually been published and distributed a year or more, as the case might be, before the last part, the title page bearing the date only of the latter, and being printed with it. Mr. Say seems almost to have foreseen the consequence of this carelessness, for he had separate title pages printed to a considerable number of copies of his paper above named, and these copies were stitched and distributed by himself to his correspondents. I have one of these same copies.

You ought not to take the dates of Say's insects in the Transactions of the American Philosophical Society, New Series, Vols. IV and VI, from the dates of those volumes, excepting only what begins on p. 177 of Vol. VI, with *Elater bellus* and onwards, which was printed from Say's manuscript. All the preceding portion is a reprint of his New Harmony papers, dating from March 17, 1830 to August 1, 1834. It has been generally supposed that these New Harmony papers came out only in the "Disseminator"; this is not true. Only a few numbers appeared in the Disseminator, and of these separate copies were struck off, and were stitched with the succeeding sheets, and were distributed by Mr. Say with a separate title page, till he had gone to the seventy-third page of the work. The last eight pages were printed after the title page, and only a short time before his last sickness and death. About one half of the whole work, ending with the description of *Lathrobium dimidiatum*, was actually printed and distributed in 1830. Thence to *Anthophagus verticalis* inclusive, in 1831; thence to *Aleochara semicarinata* inclusive, in 1832; which finished what is contained in the fourth volume of the Transactions of the

American Philosophical Society. Thence to *Agrilus politus*, in 1833; and the remainder, to *Elater exstriatus* inclusive, in 1834.

In your list of species unknown to you is enumerated the *Feronia caudicalis* of Say, and yet you have a doubtful reference to it on page 243, under *P. luctuosus.* For a specimen of a *Feronia* which I sent to Mr. Say, he returned me the name of *caudicalis*, and I have (without, however, very critically comparing the species with his description) supposed it to be rightly so named by him. The insect belongs to a group which I had previously studied, and therefore I could not have made any mistake as to the identity of the specimen retained with those sent. You must have seen the insect in my cabinet. His *Agonum scutellatum* is merely an accidental variety of a small and very common species, the variation consisting in a depression about the region of the scutel, which is sometimes found in various species, and which is purely accidental. I think you told me that my species (in which this occurs) is *melanarium* Dej. It is not, however, what I consider as *melanarium.*

HARRIS TO LECONTE.

CAMBRIDGE, Dec. 21, 1852.

How Fabricius and Olivier came mutually to quote each other for *Cantharis atrata* will appear when their works are fully examined. You will find the species described by Olivier in the Encyclopédie Méthodique before the date of his Entomologia Systematica; and you will find it in the earlier works of Fabricius, as well as in his Systema Eleutheratorum. *Meloe cinereus* Forster, is undoubtedly the species known to us by the name of *C. marginata* Oliv. and is probably also the *L. marginata* Fabr., who however gives for its habitat the Cape of Good Hope. I have very little doubt that Fabricius was in error as to the place, and moreover, I believe he may have described the insect from the cabinet of Sir Jos. Blake, where also Olivier, and probably Forster, saw it. Schönherr is wrong in referring Forster's species to *cinerea* Fabr. Now, although Forster describes his *M. cinerea* in 1771, and Fabricius his *L. marginata* in 1775, yet this is one of those very rare exceptions which I would make in the rule regarding priority. Forster's name is evidently faulty and deceptive. The Fabrician name is exceedingly pertinent, being descriptive and unmistakable; it is annecessary to add that it has been long established, for that does not make wrong right; though in this case, added to the other advantages arising from retaining it, it may be allowed to have some weight. But we have a species which is cinereous, and to which Forster's name may with very great propriety be applied; and since this species has also long borne this truly descriptive and pertinent name, I think it best to let it so remain. Hence, because the *Cantharis* of *Clematis virginiana* is a marginated species, and the *Cantharis* of the *Leguminosæ* (*Baptisia*, etc.), is a cinereous species, I have been contented to let the former bear the name of *C. marginata* and the latter that of *C. cinerea*, which Fabricius gave respectively to them.

By the way, did you ever see a *Brachinus* clear its antennæ with its forelegs? It would give you an idea of the use of the deep emarginations in the anterior tibiæ, which are admirably calculated to assist the insect in this operation. Some naturalists have conjectured that the emargination was designed for sexual purposes, but it is not so, for otherwise it would not exist in both sexes.

In copying my Catalogue, I have come upon a few corrections made by you in the names I had given, in which it appears to me you were wrong, from not having examined the authorities that I had consulted. I recollect only one instance at this moment. It is this: "*Buprestis aurulenta* Linn.=*striata* Fabr."; you added, "not *aurulenta*, which is European." The *aurulenta* of Linnæus is really North American, and is of earlier date than *aurulenta* Fabr., which is European. The latter is *auricolor* Herbst; and there is another *aurulenta* of Rossi = *austriaca* Fabr. See also Olivier and Herbst for our *aurulenta*. In all those cases where I have rejected a Fabrician name, I have adopted the one substituted from an earlier authority which has been examined for the purpose. In my printed catalogue you will find several cases of this kind.

HARRIS TO LECONTE.

CAMBRIDGE, May 14, 1853.

Your specimens of *Eurypalpus*, with the pupa, were safely received, and I am obliged to you for them. In the dry state I am unable satisfactorily to examine the pupa, which however has in its general configuration considerable resemblance to *Eurypalpus*. Among my *Cebrionidæ* I find a single specimen of *Eurypalpus?* from New Hampshire, which I have been hitherto unable to refer to any described genus; but it differs from yours in having pectinated antennæ. It is the *Physodactylus ? cisteloides* of my printed catalogue. I was not aware before receiving your letter how much revolution had been made in the *Cebrionidæ* or *Cebronites* of Latreille. Westwood I knew had divided them into two groups, *Cebrionidæ* and *Cyphonidæ*, but I supposed these would be regarded rather as sections of one family. There is no intimation in your paper in the Lake Superior book that you regarded *Eurypalpus* as belonging elsewhere than in the same group with *Cyphon* where Dejean seems to have put it; and now are you not rather hasty in transferring it to the *Macrodactyla* of Latr. ?, or the *Parnidæ* of Erichson ?

A few days ago, Mr. Clark found an aquatic larva, almost exactly like one figured by Westwood among the *Lampyridæ*, but having beneath the terminal segment five bunches of branched filaments, from their constant motion evidently connected with respiration. Unfortunately the specimen was lost before a drawing could be made of it. Classification will become still more complicated if it turns out that there are aquatic larvæ among the *Lampyridæ*; and this should serve as a caution against removing *Eurypalpus* from the *Cebrionites*.[1]

I have not now any specimens of *Xenos Peckii*, the only one of the Strepsiptera which I have seen. This species infests our common *Polistes fuscata*, the species of slender, brown wasp that makes an open, horizontal comb, suspended by a stem beneath some sheltered spot. I have found their combs in the hollows of the skulls of sheep. Some naturalists have stated that only female Hymenoptera are infested by the Strepsiptera; but I have seen as many males as females attacked by them. I used to find the infested wasps most plentiful about the twentieth of August, when pears begin to ripen and fall from the trees. These wasps are very fond of the fallen decaying pears; and

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[1] [I append here a note of a similar larva found by Prof. Clark two years previously, adding Dr. Harris's note thereon, and a memorandum by Dr. LeConte.]

This Coleopterous larva found at Fresh Pond on August 17th, 1851 [Pl. III, fig. 7], adheres to the surface of stones and generally to such as are round; the circulation of water among the branchiæ is kept up by the flapping of the tail-piece. The sides of the body are extended out into a broad, concavo-convex shield, under which the head and feet are hidden. The head is furnished with mandibles, maxillæ and their palpi and biarticulate antennæ; the base of attachment to the tail-piece is raised into a high rim. Cellular transparent branches extend out from the sides of the abdomen into the flattened side pieces, toward the extreme edge of which tracheæ may be seen branching. H. J. Clark.

On comparing the description of the supposed larva of *Eurypalpus Lecontei* given by Dr. LeConte in the Lake Superior of Agassiz and Cabot, p. 241, with Mr. Clark's drawings, the former will be seen to differ in several respects from the latter. Dr. LeConte says that the head "is concealed under the large, shield-like prolongation of the dorsal epidermis of the prothorax." If Mr. Clark has rightly represented the connections of the legs, the portion anterior to them, which covers the head, cannot be a prolongation of the prothorax, but must belong to the head alone, and is to be regarded as a clypeus. Dr. LeConte says that the antennæ are "a little longer than the head"; in the drawing they are much longer than the head and each joint shows no "tendency to become divided at the middle"; the maxillary palpi are more than "half the length of the antennæ." Dr. LeConte says that "the abdomen is furnished on each side with six bunches of long branchial filaments"; in the drawing there are the infested wasps can always be detected by their peculiar zigzag or irregular flight. So remarkable is their appearance in flying that I have detected them even when riding along the road and have stopped and caught them among the bushes by the way-side. After catching one of these infested wasps, put it under a tumbler, and feed it with sugar, and in a few days or a week or two, you may have winged specimens of the male *Xenos* in the tumbler. This insect is very impatient of confinement, and keeps in almost perpetual flight till it seems to die from exhaustion. The females never come out of the wasps, and are not to be distinguished without close examination from the cased pupæ or mature larvæ. You will see the black heads of the one or of the other just protruding from the intersection of the dorsal rings of the abdomen. I have found four specimens in one wasp. Two or three are common. This is about all I can tell you of the insect from my own observations. Some years ago I drew up a little paper on the relations of the Strepsiptera, and came to the conclusion that, from the structure and habits, as far as then known to me, they

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only five. "A larger bunch connected with the anal aperture" is not shown in the drawing.

These differences lead to the suspicion, either that Dr. LeConte has not correctly described the larva or that the figure drawn by Mr. Clark represents another and different insect. T. W. H.

Since reading the above note I have reëxamined the specimens of *Psephenus* larvæ, collected by me at Niagara, and find no reason to change the description published by me in Agassiz' Lake Superior, except in regard to the branchiæ, which are five, as figured by Mr. Clark, instead of six as stated erroneously by me. The head is small but prominent, and concealed under the shield-like pronotum and the membrane of the articulation is distinctly visible. The appearance of a tendency to division in the joints of the antennæ is caused by a slight compression and twisting or rather by a faint oblique impression. I may also add that the larva described was not the 'supposed' but the *ascertained* larva of *Psephenus* (late *Eurypalpus*) since pupæ, having the recognizable form of the perfect insect were found under stones near the water, protected by the shield-like epidermal extension of the larva. I have also examined the very nearly allied larva of *Helichus fastigiatus*, and the remotely allied *Stenelmis crenatus*, in both of which there is a hood-like prolongation or rather expansion of the pronotum; the last named has however no external branchiæ. [J. L. L.]

were more nearly allied to the Coleoptera and Hymenoptera than to any other order of insects. But I did not venture (nor shall I now) to place them in the order Coleoptera although in organization the Strepsiptera are coleopterous rather than hymenopterous. Moreover the young larvæ are very much like those of *Symbius*, which likewise are parasitical in their habits. The structure of their feet, however, removes them decidedly from the Coleoptera, and still more the peculiarities of their transformations. No instance is known among the Coleoptera of any larvæ being pedate and active when young, footless and fixed subsequently, and becoming coarctate pupæ. The fact also that the female remains in an apparently undeveloped state within the larval skin, and has to be impregnated (as that of *Oiketicus* is) through an opening in the head of the pupa, is an anomaly without precedent among these orders of insects. I do not know who has had the hardihood to crowd the Strepsiptera into the order Coleoptera; but it certainly is a measure as inappropriate as that of putting the *Mallophaga* (*Nirmus*, etc.) among the Orthoptera and Neuroptera, as some naturalists have done. When you come to consider the entire structure in detail, and the singular transformation of the insects, you will see that the latter must stand by themselves, and that they cannot be placed in the order Coleoptera without violating all analogies, and all legitimate rules of classification. The mere possession of the abortive elytra and slender mandibular organs is not enough to justify such a step. Their other relations to the Coleoptera are overbalanced by structures far removed from what are found in that order. I express this opinion with great confidence, after long consideration of the subject, and patient investigation, with the best lights afforded by my own observations and the various published memoirs on these insects.

HARRIS TO LECONTE.

CAMBRIDGE, Sept. 17, 1853.

I have changed my manuscript name of the new *Cicindela* from the White Mountains from *ancocisconensis* (objectionable on account of its length and because you tell me it has been taken in Pennsylvania) to *Catharina*. This fine species seems to approach to the European *C. maritima*, and like it is found only near the water. As you are fond of Latin descriptions I subjoin one that I concocted for this species. *C.* (*Catharina*) *labro albo tridentato, medio subprominulo; supra aeneo-nigra vel nigro-cuprea, viridi tenuiter marginata; elytris e humerali apicalique integro, strigaque media, obliqua, abbreviata, flexuosa, cum lineola laterali confluente, albis; ano purpureo. Long.* 5, 5½ *lin.*

I believe you will be able to make out the species by the above description, especially as you have specimens before you. By the way, I prefer calling the humeral and apical white characters a c rather than a lunule, the former being nearer to their true shape. A lunule proper tapers to a point at the extremities.

HARRIS TO LECONTE.

CAMBRIDGE, Oct. 29, 1853.

Now upon the genus *Adrastus* I have a remark to make. Dejean puts both *E. quadrimaculatus* and *E. limbatus* in this genus, the former having simple and the latter pectinated or toothed nails, and the two differing from each other in several other particulars. Twelve or thirteen years ago, having just received Dejean's Catalogue, and being ignorant of the existence and contents of Latreille's paper on the Elaters, I undertook to examine carefully a pretty large collection of European named species for the purpose of ascertaining on what characters the genera of Elaters in Dejean's Catalogue were founded, and in many cases, I drew out the characters in detail, and still have them by me in manuscript. At that time I concluded that the two species above named could not both be included in *Adrastus*; but which of the two was to be regarded as the true type I could not tell, and therefore made my own election, adopting the *quadrimaculatus* as the European type. If, however, the *limbatus* be the true type, I suppose you or somebody will have to make a new (sub-) genus for the *quadrimaculatus* of Fabricius.

I append some of the characteristics of five closely allied species of *Agonum* (or *Platynus* Lec.), of black color, etc., arranged in a table: —

A. Fifth elytral stria not dilated behind.
  a. Two impressed points on the third, and one on the second stria.
    * Sides of the thorax regularly curved.
      † Thorax broad. Tibiæ and tarsi black . . 1770 *melanarium*[1] ? Dej.
      †† Thorax narrow. Tibiæ and tarsi rufous . 61 *politulum*[2] Hentz.
    ** Sides of the thorax somewhat angulated . 1771 *nitidum* Harr. MS.
  b. Impressed points irregularly disposed; one impressed point on the third stria, one on the interval between the second and third stria, and the third on the second stria, or on the third interval . . . . 1525 *collare* Say, ined.
B. Fifth elytral stria dilated behind, one impressed point on the third stria, and the other two on the second stria . . . . . . 1772 { *Harrisii* LeConte. / *sulcatum* Harr. MS. }

HARRIS TO LECONTE.

CAMBRIDGE, Nov. 24, 1853.

The insect you have sent me as the "*Elater collaris* Say, *verus*" seems to me to be a variety of Say's *E. rubricus*, with an immaculate thorax. Say's description is faulty, because drawn from a variety or immature specimen with rufous elytra. Perfectly mature specimens have the elytra black; but there is considerable variation even among these. In some the oval black spot covers a great part of the blood-red thorax, reaching almost to the base, and between this and the entire want of the black spot every gradation in size of the spot may be found. In a series collected in Maine, I found some exactly like your specimen, taken in the same place and at the same time as others with the spot and with the black elytra, as well as others with testaceous or rufous elytra.

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[1] Dr. LeConte thinks this a mere variety of 1772.

[2] *melanarium* Dej. (to Dr. LeConte).

HARRIS TO LECONTE.

CAMBRIDGE, March 2, 1854.

I have seen numerous specimens of *Cicindela vulgaris* from the Southern States, which were invariably smaller and less highly bronzed than those which occur here. In Townsend's Oregon collection there were specimens also slightly differing both from our New England and from the southern specimens. Still these all agreed with each other in so many respects, that only the practised eye of an expert entomologist would recognize any material difference between them, and on the whole, there does not seem any more reason for separating them as distinct species than for separating some of the remarkable varieties of *C. purpurea* as such.

HARRIS TO LECONTE.

CAMBRIDGE, March 6, 1854.

Did you particularly notice among the specimens from Missouri a *Cicindela* resembling *marginata* Fabr. (= *variegata* Dej.)? Perhaps you took it for one of the varieties of the latter. Having carefully compared and examined both, I am satisfied that the Missouri specimens are distinct from the *marginata*; and, as Dejean's name *variegata* has been dropped, I propose to transfer it to this Missouri species if undescribed. This species should find a place in catalogues near to *marginata*; but it does not seem to be included either in your catalogue or in those of Dejean, or Dr. Melsheimer. Has any description of it been published? Though belonging to the same group as *marginata*, which likewise it strikingly resembles in the white markings of the elytra, it differs essentially in the following particulars. The male wants the posterior tooth near the tip of the right mandible. The teeth on the edge of the labrum are obsolete (the central one, usually the most prominent, being scarcely visible at all). The outer margins of the elytra of the female towards the tip, have a conspicuous tooth, followed by an emargination extending to the apex; and the inner margin of the apex is not curved downwards. The hinder part of the intermediate band is continuous, not so much dilated, and not broken up into venose fragments. It is somewhat smaller and more brilliantly colored than *marginata*. The posterior angles of the thorax are not elevated; but before the angles there is a transverse elevated line or tubercle. It is interesting to find a species so closely imitating the elytral markings of *marginata*, but yet differing from it in other essential characters, although the most remarkable of these happen to be sexual characters. Perhaps you have not noticed the additional or posterior tooth of the right mandible in the males of *Cicindela dorsalis* and *marginata*. If not, let me recommend it to your notice. It is visible only on viewing the mandible sidewise, as it projects backwards nearly at right angles with the posterior face of the mandible. In both sexes of *C. dorsalis* and *C. marginata*, and in the male of the Missouri species, there is a slight prominence on the outer edge of each elytron towards the tip, followed by a narrowing or straightening of the margin backwards; an indication of an approach to the tooth and emargination which characterize the elytra in the female of the Missouri species. The thorax of the latter approaches to the cylindrical or barrel shape that it takes in other groups, departing (gradually, however) from the quadrate form with elevated posterior angles, which is found in *dorsalis* and *marginata*, and agreeing in this character with *blanda* and *lepida*. I have not a male of *blanda*, and therefore have not seen whether it has the posterior tooth of the mandible; but infer from other circumstances that the tooth is wanting. It seems very singular that a species so near to our maritime *C. dorsalis* and *marginata* should be found in Missouri, and I would be glad to know whether the Missouri species lives on the banks of streams, or other wet places.[1] I have taken *marginata* on the muddy banks of salt water creeks, amongst the grass to the water's edge. My Cambridge specimens are more dull in color than those I have from Florida, and the white markings of the elytra are often obsolete. They are likewise generally larger than southern specimens. The only part of Massachusetts where *C. dorsalis* has hitherto been found is the shore of Martha's Vineyard, where also *C. patruela* has been found. The latter occurs on the shores of Lake Champlain, in Burlington, Vt., but I have seen it from no other part of New England. *C. generosa* and *rugifrons* were formerly abundant on the sands beyond Mount Auburn, about one and a half miles from my residence; they are now almost banished from the place by the cutting of a railway, and a little settlement which has grown up in that place. They may still be found on Lynn beach, and some other of our sea-beaches, where only have I met with *C. hirticollis* (*albohirta* Dej.).

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[1] The species here referred to is *C. cuprascens* Lec. and is quite common on the banks of the western tributaries of the Mississippi and Missouri. [J. L. L.]

HARRIS TO LECONTE.

CAMBRIDGE, April 21, 1854.

Half a dozen specimens of the greenish variety of *Cicindela limbalis* were sent to me from Ohio a few days ago. They were perfectly fresh, having been just taken, and were not yet stiffened. No two are exactly alike in color, and there is some difference in their markings. Upon a careful comparison of *spreta* with them, I am compelled to reverse my decision respecting the latter, and must confess, notwithstanding the differences noted in a former letter, that *spreta* seems to me really to be a dark, or as Zimmermann would call it, negro variety of *limbalis*. It would be interesting to ascertain whether the *limbalis* found at Eastport, Maine, usually assumes this dark hue, or whether typical specimens prevail there. Among thousands of specimens of *C. rugifrons* which I have seen on the sands beyond Mount Auburn, on Chelsea beach and elsewhere, I have never met with any so black as my single specimen of *C. obscura* from New Jersey; and the very few dark specimens of *rugifrons* which I have met with were always tinged more or less with green. Still I have no doubt that *obscura* should be really referred to *rugifrons*; and I am curious to know whether this negro variety is common in the Middle States, and also whether it occurs by itself or in company with characteristic specimens of *rugifrons*. The questions regarding it are of the same nature and interest as those which may be made respecting *spreta* and *limbalis*.

Since receiving your last letter I have borrowed of Professor Agassiz the Proceedings of the Academy of Natural Sciences for April, 1852, containing your descriptions of *Cicindela cuprascens* and *C. tarsalis*. From these I infer that the single specimen from Georgia, given to me by your father for *blanda* Dej., must be your *C. tarsalis*, on account of the prevalence of white upon the elytra. Until I read your description of *tarsalis*, I had never compared my specimens with Dejean's description of *blanda*, and took it for granted that my specimen was a typical one of this species, which I now find it is not. Where did the specimens come from, which your father sent to Dejean, and which were the types of his description of *blanda*? You will observe that Dejean makes no mention of any emargination near the apex of the elytra of the female, and indeed he does not note the sexes of his specimens at all.

HARRIS TO LECONTE.

CAMBRIDGE, May 10, 1854.

Your last communication does not give me all the information wanted on the subject of my last letter, and leaves the question of the identity of the *Cicindela blanda* of Dejean more doubtful than ever.

I beg you to refer to Dejean, Species Général, Vol. V, p. 238, for the following quotations concerning his *blanda*, "*La lèvre supérieure . . . a, dans les deux sexes,*" etc., "*Les élytres . . . surtout dans la femelle,*" etc. See also the remainder of the description. From these quotations it appears that Dejean had both sexes, and certainly the female. Now this being true, or admitted to be true, would Dejean have neglected to describe the remarkable excision of the outer margin of the elytra of the female, if such excision existed in his specimen? I trow not. It appears to me that Dejean must have been culpably negligent in drawing up his description of *blanda*, or must have mistaken (!) a male for a female, or that the species which you have taken to be *blanda* is not the real *blanda* of Dejean. I do not believe that one species would be found to vary to so great an extent as to have emarginated elytra in one female, and entire elytra in another. May not Dejean's *C. blanda* be some variety of *C. variegata* with which he compares it, — or some species, unknown to us, intermediate perhaps between his *variegata* and *tortuosa*?

What you state, quoting from Dejean, of the terminal lunule being nearly lost in the lateral margin, does not seem to me of so much importance as the structural character of the elytra of the females.

Mr. Alex. Agassiz told me that on examining his Missouri specimens, you gave to them the name of *Cicindela cuprascens*, and I find that they agree in the main, though not in every particular, with your description, as stated in my last letter. I remember now that all the trochanters (not the hinder ones only) are red or testaceous in the Missouri specimens, as they are in my white *Cicindela*, which your father gave me. The latter, since reading your description, I have referred to your *tarsalis*, though my specimen has the tarsi mutilated, so that I cannot judge of their comparative length. Having only a male of this supposed *tarsalis*, I do not know except from your description, how the elytra of the female are constructed, and even this seems a matter of doubt, for although in your descriptive catalogue, under *C. blanda*, you say "*elytra in fœminis profunde sinuata*"—in your description of *tarsalis* (Proc. Acad. Nat. Sc. Phil., VI, p. 66) you refer only to "one male," and make no mention of any female, or of the structure of the female elytra of *tarsalis*.

I venture to suggest the following conclusions in regard to these species, etc., though it may be rash to do so without seeing your specimen.

1. *C. blanda* Dejean. Elytra in both sexes entire. (Georgia?)
    var. *albina vel decolorata* (*C. tarsalis* Lec.) Georgia.
2. *C. cuprascens* Lec. Elytra in the female emarginated.
    C. blanda α Lec., from Conn. River and St. Croix, Wisconsin.
    ——— β Lec., from Arkansas River and Missouri?

The Roanoke specimen or specimens, referred to in your Catalogue, but omitted in your last letter, remain to be disposed of.

Have you got them, or were they (as I suspect) those which your father sent to Dejean? The foregoing arrangement is based on the presumption that the typical *blanda* of Dejean remains to be found and that the female of your *tarsalis* has entire and not emarginated elytra, thereby agreeing with the true *blanda*, of which it is to be regarded as only an albino variety. This satisfies me, and I hope it will you.

CORRESPONDENCE

BETWEEN

THADDEUS WILLIAM HARRIS

AND

MISS MARGARETTA HARE MORRIS.

CORRESPONDENCE.

HARRIS TO MISS MORRIS.

(Without date.)

Sometime last summer, a little parcel was put into my hands containing some insect's eggs. These arrived during my busiest season, and as the eggs were new to me, they were laid aside for further examination when leisure would permit. I have this day received a similar sample of eggs on a twig of the white rose-bush. They were brought from Pennsylvania, and my friend says they are the eggs of the large-winged, green grasshopper (probably he means *Phylloptera oblongifolia*), which lives on trees and shrubs in Pennsylvania. These eggs are of a brown color, about one eighth of an inch long, oval, but laterally compressed, and seemingly composed of two parts like a bivalve shell. They are arranged obliquely, and overlap each other, in a double row along the sides of the twig. They are in fact exactly like the eggs sent by your sister. I have never seen the eggs of the Katy-did, nor of any other of the tree *Grylli* [*Locustariæ* Latr.]; but I have long suspected that these insects laid them on trees because I never saw them laying their eggs in the ground, after the commonly observed manner of the *Locustæ* [*Acrydii* Latr.]. The accounts given by European authors of the habits of the *Grylli* are derived from those of *Gryllus viridissimus*, *verrucivorus*, etc., all which are constantly represented to lay their eggs in the ground. Hence my general remarks on the group contained in my book, p. 126, are derived from European accounts, and in this the same statement occurs that the *Grylli* "commit their eggs to the earth."

If the information given by my friend be correct, then my suspicion becomes verified, and my statement must be changed. I confess, however, to belonging to the sect of doubting philosophers, and am not fully reconciled to the conclusion that the eggs in question are those of the great, green, tree *Gryllus*. I suggested to my friend that they might be those of the *Spectrum femoratum*, which Mr. Say, in his American Entomology, has represented as inhabiting the rose bush.

HARRIS TO MISS MORRIS.

CAMBRIDGE, Oct. 23, 1849.

All the Notodontians (together with *Limacodes*) remain a long time in their cocoons, or in earth, before turning to pupæ. The parasite of the Drop-worm is *Ichneumon concitator* Say, a very common and somewhat variable species, which attacks all sorts of larvæ. It is one of the most common parasites of *Clisiocampa americana*.

The parasites of the Saddle-worm appear to be identical with my No. 366, *Microgaster carpata* Harr., Catal.

HARRIS TO MISS MORRIS.

CAMBRIDGE, Sept. 25, 1850.

The Drop-worms claim notice first. Last autumn, my good friend, Dr. Henry Bond, sent to me from Philadelphia a box full of their pods, containing eggs in great numbers. Early in the spring, I tied twenty or more of them to the twigs of an Arbor vitæ tree in my little enclosure, and gave the remainder to Professor Agassiz and to other friends, with instructions and cautions respecting them. In my little place, I have but a single Arbor vitæ, a magnificent specimen; it was above fifteen feet high, a dense and graceful pyramid from bottom to top of deep green foliage, and so planted as to be a pleasing and conspicuous object from the parlor windows. For a long time I looked for the larvæ in vain. During the whole of June, and the early part of July, my time was so entirely given to the Library (this being my busiest season of the year) that I hardly thought of the tree and the drop-worm at all. It was not till the twentieth of July that I was at liberty to make a careful examination of it, and then to my surprise I discerned vast numbers of the insects upon it, but principally at the very summit, where they had begun the work of destruction in earnest. It seems that the greater part of the worms, soon after being hatched near the bottom of the tree, made their way to the top, so that they escaped observation until carefully looked for. Already the top of the tree began to show bare twigs, and the foliage below was filled with masses of chippings, looking like brown saw-dust. The pods were not more than three eighths of an inch long, of a conical shape and green color, and were often borne vertically above the body of the insect, like a shell on the back of a snail. Within a week, the insects began to appear plentifully near the lower part of the tree, and I thought it high time to diminish their numbers, and began killing all I could reach from the ground. Some of the insects were carried, apparently by the wind, to neighboring trees, and some were found on an apple tree above a hundred feet from the Arbor vitæ. All the stragglers that could be found were promptly killed, and I set my little son at work on

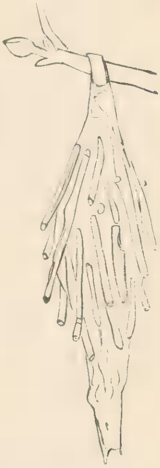


Fig. 29.

a ladder to catch all that he could reach on the Arbor vitæ, but this did not much reduce their numbers, for in the early part of August, the whole tree was alive with them, and I had to give an hour or two every fair day to killing them; but, as this could be done only by crushing their pods singly with the thumb and finger, it was slow and tedious work. On the sixth of August I left home for an excursion to Maine and the White Mountains. Before leaving home, I charged the boys to kill all the drop-worms they could find on the upper half of the tree. Upon my return on the seventeenth, I found they had done as directed; but the tree at the top, for the distance of six feet downwards, was now entirely bare of leaves, and the foliage below was becoming very thin. There must have been millions of the drop-worms on the tree, it seemed to me, to have done all the damage, for the insects were still very small, few of their pods being more than three fourths of an inch long. I have continued killing the insects, and still have many left; but owing to the rains, or the cool weather, or both, they have not grown fast, and only one pod has been seen of full size, and probably the greater part will be arrested by the frost and by cold weather before they have come to their growth.

I have a single specimen of a moth which I suppose to have come from a saddle-worm. The head, thorax and fore wings are pea-green, the latter with a triangular spot on the middle of the front margin, and with the broad outer edge brown or nankin color, as are the abdomen, hind wings and short, pectinated antennæ. The specimen is a male.

The *Limacodes* that you have sketched in your last letter is the *pithecium.* Though generally very rare here, it has occasionally been seen in considerable numbers. One of my agricultural friends told me of a swarm of these which once appeared on a cherry tree, and nearly stripped it of leaves. It is very singular that this larva casts off spontaneously the long, flattened and velvet-like projections on the sides of its body before making, and frequently uses them in the construction of, its cocoon.

On the Lilac and on *Prinos verticillata* you may find another very extraordinary caterpillar, whitish in the middle, brownish at each end, sparingly clothed with a few hairs, having a big hump on the top of the eleventh segment, and resting in an oddly crooked attitude, or when disturbed wagging its head violently from side to side. This creature grows to the length of one and one fourth inches, or more. Before cold weather it eats a burrow in the side of a dried branch, and retires within it, where it remains unchanged all winter, and sometimes for more than a whole year. Ordinarily, however, it transforms to a beautiful six-spotted moth in June. This moth comes near to the genus *Thyatira*, I believe, and I call it *Thyatira ? sexguttata*. [See a letter from Harris to Doubleday, March 24, 1849.]

The caterpillars of our fine butterflies, *Limenitis Ephestion* and *Misippus*, will soon begin to make the little leafy cones of the bases of leaves upon willows and poplars, into which they retire for protection during the winter, and in which they remain unchanged till the following spring.

HARRIS TO MISS MORRIS.

CAMBRIDGE, Oct. 29, 1850.

Your No. 2, larva and moth, is the insect which I name *Notodonta* (*Gluphisia ?*) *ulmi*. The moth, as well as the larva, is subject to a good deal of variation. One character, however, it retains (and this is visible in your specimens), namely, an oval whitish spot near the base of the fore wings, more conspicuous in some lights than in others, but always discoverable under a glass, by the whitish color of the scales on that spot. I have found this insect very difficult to raise to the winged state. The larvæ found late in autumn, remain a long time unchanged in the ground, and are very apt to die during the winter. After many trials with more than a hundred larvæ in all, I succeeded at last in obtaining one perfect moth from them, and secured it before it had (like some others) injured itself by beating about in confinement. I am glad to have cleared up the history of this insect, which has been a puzzle to me these ten years.

A skilful gardener here encourages me to hope that my Arbor vitæ may recover from the attacks of the *Oiketicus*, or Drop-worm. These insects, or what was left of them when I last wrote to you, have nearly all perished. From your specimens of the pods, I have obtained one perfect male, and secured it while it was fresh and uninjured. I have also taken out of their chrysalis skins two perfect and lively females, have given one of them to an artist to figure with the male, and have preserved the other in spirit. I have had good drawings made of the worms, and shall have the chrysalis figured also. This *Oiketicus* proves to be distinct from the two species described and figured by Guilding in the Linnæan Transactions, Vol. XV, and it is also, I think, different from the southern species described in Newman's Entomologist by my lamented friend Doubleday. Dr. Œmler of Savannah, has sent me a copy of one of Abbot's drawings of this southern species. The male is nearly twice as large as the Pennsylvania insect, and differently colored. It lives also not on the Arbor vitæ, but on *Diospyrus*, *Cratægus*, etc. The climate of New England is evidently unfavorable to these insects. The cold weather and the rain that we had during the last of August and beginning of September, before the larvæ had come to their growth, proved fatal to nearly all of them.

Among the very few insects that I brought from the White Mountains was Say's *Cicindela longilabris*, figured under the name of *C. albolabris* in Kirby's Fauna Boreali-Americana. I found there another species of *Cicindela* apparently undescribed. An *Ægeria*, with pectinated (!) antennæ was another of the novelties discovered, and the singular *Ægeria caudata*, with a pencil-like brush at the end of its body, half an inch in length. I got also specimens of *Limenitis Arthemis*, which is peculiar to that region, and is found only where *Eupatorium ageratoides* occurs.

HARRIS TO MISS MORRIS.

CAMBRIDGE, Dec. 16, 1854.

Since the publication of my Catalogue [of the *Sphingidæ*], I have obtained only one species not included therein, namely, the *Sphinx Brontes* of Drury, figured by the latter, and also in the Species Général des Lépidoptères of Dr. Boisduval. I have obtained some larvæ of Sphinges, which I had not seen before making the Catalogue; and have now in the chrysalis state a lot of a very extraordinary kind, from which I hope to get the winged insects next spring. They were taken on the common Creeper, *Ampelopsis quinquefolia*, in Waltham, last August, by my former pupil and friend, Rev. Thomas Hill. They differ from most of the larvæ of *Sphingidæ* in not having any horn at the hinder extremity, nor any oblique lines or spots on the sides of the body. I suspect they will turn out to be the larvæ of *Thyreus nessus*.

I come to your specimens, male and female, of the saddle-back moth, *Limacodes ephippiatus* [Pl. I, figs 7, 8], as I propose to call it (*ephippiatus* being the Latin for equipped with a saddle). Last year Prof. J. P. Kirtland of Cleveland, Ohio, sent to me a small lot of insects, among which was a small and imperfectly developed male of this *Limacodes*, being the first one of this sex that I had seen.

Having both sexes, I was pleased to find that the insect was congenerical with Hübner's *Streblota nesea* from Brazil, both sexes of which he has figured in his Sammlung Exotischer Schmetterlinge, Vol. III, tab. 32. Hübner has divided the genus *Limacodes* into several other genera, founded upon the coloration of the wings, etc., but not upon characters derived from the larvæ, few of which were known to him; and it so happened that he has got for another *Streblota* an insect which I am confident is not a *Limacodes* at all.

A young Dr. Œmler of Savannah, son of a deceased correspondent of mine, has lately sent to me for examination a collection of drawings, made by old Mr. John Abbot of Georgia, one hundred and sixty-three in number, representing butterflies, sphinges and moths of that State, with the plants on which they feed. They are not very correctly done, but in general are enough like the original to be recognized, with perhaps a few exceptions only. Among these there is a very good colored figure of the saddle-back caterpillar, and very poor representations of the moth and chrysalis. The moth, however, exhibits one characteristic, which, in your specimens, and in the one from Ohio, is only partially developed,—that is, a large, snow white spot extending from the inner edge of the upper wings towards the middle of each wing. Now in your specimens there are two little white dots, instead of each one of these spots, neither of which dots touches the inner edge of the wing. Your specimens show also a white dot on each forewing towards the tip, but these are omitted in Abbot's drawing.

By the way, what plant was it on which were the saddle-back's cocoons that you sent me? [*Celastrus scandens.* M. H. M.]

MISCELLANEOUS CORRESPONDENCE

OF

THADDEUS WILLIAM HARRIS.

CORRESPONDENCE.

HARRIS TO SAY.

MILTON, March 19, 1829.

It was through inadvertence that *Dytiscus thoracicus* was published. It is identical with your *D. liberus*, sent you by me and described in the Journal of the Academy of Natural Sciences.

A few descriptions and coarse figures are appended here, upon which I beg you to offer your remarks.

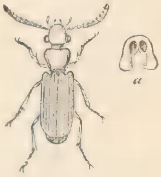


Fig. 30.

1. *Zuphium? bicolor* (N. E. Farmer). Natural size (as are all the others but the second and seventh). *a*, mentum, concave beneath, with a triangular elevation, acuminated before between the deep oval fossæ, containing the basal joints of the external maxillary palpi.

2. Trophi of one of the *Carabidæ*. [Fig. 31.] *a*, mentum and labrum with palpi; *b*, maxillæ and palpi; *c*, right, and *d*, left mandible; *e*, labrum. This insect measures four tenths of an inch in length; dark castaneous above, paler beneath. Antennæ moniliform, or composed of very short, obconic joints; first joint thick, one third longer than the second, which nearly equals the third in length. Head large; thorax convex, obcordato-quadrate, anterior angles rounded, posterior ones rectangular; disk glabrous, an impressed, dorsal line composed of contiguous, oblong punctures,

base with distinct, deep punctures. Elytra glabrous, striæ deep, slightly crenated, interstitial lines nearly flat. External edges of the tibiæ (except the superior portion of the anterior) spinous, inner edges with strong bristles or elongated, slender spines; tarsi spinous, nails simple. Specimen, a female sent me from Philadelphia, in which vicinity it is said to be not uncommon. It is remarkably robust, and has some resemblance to the figure of *Harpalus dubius* in Palisot de Beauvois. Can it be a *Morio* ?

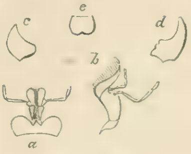


Fig. 31.

The three following are *Elateridæ*, which, with two smaller American species and the European *E. unguliserris* and *fuscipes* Schönh., I propose to include in a subgenus denominated *Nothora*, distinguished by having the thorax and coleoptra equally broad at base, and attenuated at the extremities, the antennæ simple and the nails pectinated.

Nothora 1. Pale reddish brown, densely covered with depressed, pale, ochreous hairs. Antennæ with simple, elongated, obconic joints in both sexes. Head and thorax with distinct, dilated punctures, the disk of the latter with an impressed line, obsolete before. Elytra punctato-striate, punctures distinct; interstitial lines minutely punctured. Length about $\frac{9}{20}$ inch. To this very common species you returned me the name of *Elater dispar ?* Herbst. It is certainly specifically distinct from the next, and to neither of them can we apply the name of *E. lividus* DeGeer, and *E. elongatus* Beauv., both of which Schönherr makes synonymous with the *dispar* of Herbst. Is it not rather the *cinereus* of Weber?

Nothora 2. Dark castaneous, antennæ and feet paler; body covered with short, depressed, yellowish hairs. Antennæ as in the preceding; head and thorax with dilated punctures, the latter with an abbreviated, dorsal line at base, obsolete on the middle; elytra punctato-striate, with small, setiferous punctures on the interstitial lines. Length nearly $\frac{5}{8}$ inch. Can this be the *fulvipes* or *castanipes* of Fabricius? He says that three species have the elytra striate, but does not call them punctato-striate. It is distinguished from No. 1 by its superior size, darker color and less dense covering of hairs.

Nothora 3. Deep black, with cinereous, depressed hairs; thorax above and ora sanguineous, feet reddish. Head black, with distinct, large punctures; antennæ robust, joints short, obconic, compressed; thorax pale sanguineous, anterior margin black, punctures large, distinct; elytra deep, shining black, minutely punctured and punctato-striate. Sides of the pectus (ora) pale sanguineous, feet reddish; tarsi paler.

I have a large true *Elater* from Dublin, N. H., which I cannot determine.

Elater sp. Black; head and thorax scabrous, with confluent, dilated punctures; antennæ short, joints obconic; clypeus with a triangular indentation; thorax broadly and deeply canaliculate; elytra puncto-striate. Second and third joints of the antennæ very short; fourth and fifth somewhat arcuated, and produced within at their tip; posterior angles of the thorax excurved, acute; elytra punctured and punctato-striate; interstitial lines convex; abdomen finely punctured, pubescent and paler at tip. Length $1\frac{1}{10}$ inches. ["Probably *E. morio* Herbst., Fabr., but my specimen is so badly mutilated I cannot judge from your description." T. Say.]

Six *Elateridæ* in my cabinet exhibit peculiar characters, which appear to entitle them to form a subgenus, which I call *Tapheicerus*. Two of these are from Carolina, of which one may prove to be *Elater marmoratus* Fabr., and will probably be published by Prof. Hentz. These insects seem to connect *Elater* with *Eucnemis* of Mannerheim (Annales des Sc., III, p. 426, etc.).

In *Tapheicerus* the labrum is exposed, corneous; palpi retracted; mouth closed below by the antepectus (?). Antennæ shorter than the thorax, clavolet compressed, joints short, serrato-dentate and concealed in repose within the antepectoral suture; pectoral apparatus perfect; posterior coxa cuneiform, not laminate; tarsi with entire joints; nails simple. Body broad, convex; thorax gibbous. At once distinguished by the dilated sutures between the ora and the antepectus, in which the antennæ are buried. If the following have been described will you give me the specific names?

Tapheicerus 1. Fuscous, black, punctured; varied with ochreous and black oval scales; thorax very short, foveolato-indented on the posterior part of the disk; posterior angles robust, incased at the points; mentum (?) very much produced and rounded in front beneath the mouth; feet paler than the body, length $\frac{11}{20}$ inch. In the male there are two small, round depressions on the disk, and one on each side of the centre. In a variety (?) some of the scales are white and disposed in oblique series on the elytra. ["Your Elater No. 1 is probably, as you suggest, *marmoratus* Fabr. Its size agrees. I have one specimen much larger from Arkansas." T. Say.]

Tapheicerus 2. Black, punctured; variegated with pale yellowish and black, cuneate scales above, and with white, short, flat bristles beneath; thorax canaliculate, posterior angles nearly rectangular: tarsi brownish. Length a little exceeding $\frac{1}{2}$ inch. Dublin, N. H. ["*C. rectangularis* nob.? I have no copy of my paper, but I think you will find that it agrees with the description." T. Say.]

Tapheicerus 3. Dark chestnut, punctured; thorax covered with yellowish, oblong-ovate scales; elytra with paler, cuneate ones; body beneath with short, flat, white bristles; thorax canaliculate, posterior angles excurved; tarsi pale. Length $\frac{9}{20}$ inch. Dublin, N. H.

Tapheicerus 4. Black, punctured, head and sides of thorax with brilliant, reddish-tawny, flattened bristles; elytra with black and body beneath with white ones. Length nearly $\frac{9}{20}$ inch. A slender species; thorax more elongated than in the others. The elytra are not striated. ["*pennatus* Fabr." T. Say.]

The third figure below represents a pentamerous insect.

The trophi are porrect; mandibles large, broad at base or triangular, apparently simple and obtuse at tips; palpi with obconic joints, terminal ones largest, rounded at tips; antennæ eleven-jointed; first joint obconic, second globular, third obconic, succeeding ones sub-moniliform or very short obconic, terminal one ovate. Very dark castaneous above, badious beneath; densely punctured, holosericeous, with short, decumbent, yellowish hairs. Head nutant; eyes large, globose, almost meeting beneath, emarginate in front above the insertion of the antennæ; the latter, with the palpi, ferruginous; posterior part of the thorax deeply indented or depressed on each side; feet slender, tarsi elongated, joints undivided, nails simple. Is it a *Boscia?* and described?

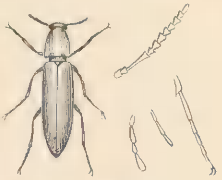


Fig. 32.

Fig. 4. Belonging to the *Cleridæ*. Black, thorax red with a black spot on the disk; last joint of antennæ very long, linear, flattened. Inhabits North Carolina. What is it?

Fig. 5. *Boletobius montanus* nob. MSS. Heteromerous. Brown, inclining to a pale snuff-color; scabrous with black tubercules; joints of antennæ short, obconic, first largest, last three transverse, forming a club, terminal one small, truncate at tip; palpi with obconic joints, terminal ones ovate, acuminate; mandibles grooved or bifid at points. Head retracted to eyes, which are reniform (not bisected as in *Eledona*); thorax with two large tubercules in front, one on each side, and two elevated sinuate lines extending from middle to base; wings none; scutel minute, transverse, oval, tuberculiform. Coleoptra with irregular series of deep foveoli; on each elytron a short, elevated line from middle of base, a larger one on disk, a submarginal one, two tubercules before the tip, the inner one very much elevated, and a smaller one on the tip; epipleura embracing body; tarsal joints undivided, equal, except the last, which is

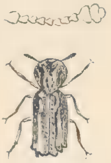


Fig. 33.

about twice as long as the preceding one; nails strong, curved, simple. Inhabits tree fungi and decayed wood in the mountainous regions of New Hampshire.

Fig. 6. Heteromerous. Antennæ eleven-jointed, inserted at sides of head in front of eyes; first joint very large, quadrate, convex and scabrous above, concave and glabrous beneath. Terminal joints of palpi ovate, acuminate; mandibles grooved at apex; eyes globose, entire, not bisected by a process of the orbits; tarsi entire, last joint elongated, others very short; nails simple. Brownish; fuscous beneath; body scabrous with elevated points; thorax elevated in the middle, with two small tubercules before and two behind; sides excavato-depressed, edge minutely denticulated, posterior margin with a tooth on each side; scutel transverse and prominent behind; disk of coleoptra elevated and separated from the minutely denticulate margin by a deep, dilated groove; suture, and on each side of elytron, three elevated lines, the latter interrupted into tubercules on the middle; two large tubercules behind above the tip, inner one largest. Epipleura distinct, broadly grooved, not embracing abdomen. Wings perfect. Dublin, N. H.

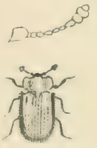


Fig. 34.

Fig. 7. *Ropalocerus fasciatus* nob. MSS. Tetramerous. Polished, ferruginous; antennæ and feet paler; head black; thorax reddish, a black, dorsal spot extending from the base to near the tip, where it is attenuated; elytra pale reddish, a dilated fascia across the middle and an apical one black. Antennæ slightly hairy, eleven-jointed; first joint obconic, large; second to eighth inclusive small, subequal, moniliform; last three dilated, transverse, convex above, slightly concave beneath. A fascicle of hairs beneath the apex of each tarsal joint, except the last which is largest; nails simple. This curious little insect was obtained in the interior of New Hampshire. Its natural situation appears to be between *Phloiotribus* and *Cerapterus*, and allied to *Paussus*.

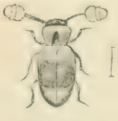


Fig. 35.

HARRIS TO ZIMMERMAN.

CAMBRIDGE, NOV. 10, 1837.

You have asked me for the characters of Mr. Say's new genus *Amblycheila*, specimens of which are among the insects brought by Mr. Townsend from Oregon and presented by him to the Academy of Natural Sciences of Philadelphia, and now in my keeping. Mr. Say established the genus in a paper printed at (New) Harmony, Indiana, in March, 1830, and reprinted in the Transactions of the Philosophical Society of Philadelphia, N. S., Vol. IV, p. 409 (4to, Philadelphia, 1834). The insect upon which Mr. Say formed this genus, he described in the Journal of the Academy of Natural Sciences, Philadelphia, Vol. III, p. 139, by the name of *Manticora cylindriformis*; he obtained it at the foot of the Rocky Mountains, in the expedition under Major Long. As soon as I saw Mr. Townsend's insects, I thought two of the species must belong to Mr. Say's new genus; but to make the matter certain, since the receipt of your letter, I have softened them in spirit, and have examined their mouths with great care. [Dr. LeConte states that one of these species is *Omus Dejeanii*, the other *O. Audouinii.*] The following are the characters in detail which the insects present: —

Tarsi five-jointed; legs fitted for running; anterior tibiæ not notched; mouth carnivorous; palpi six; labials and external maxillaries four-jointed; maxillæ with an articulated hook at the end.

Genus *Amblycheila* Say.

Head subquadrate, not contracted at base; eyes small, hemispherical.

Antennæ rather slender, filiform, with obconico-cylindrical joints; first joint thickest, about as long as the third; second joint rather more than half the length of the third; last joint (eleventh) cylindrical, obtuse at tip.

Upper lip transverse, very short, anterior edge emarginated, anterior angles produced, rounded and dentiform ; eight large, contiguous, setiferous punctures on the upper sub-margin.

Lower lip (*ligula* Latr.) concealed by the mentum.

Mandibles arcuated, ending in an elongated, acute point, and with three stout teeth on the inside ; the largest tooth, which is nearest to the base of the right mandible, emarginated at the tip ; the corresponding tooth of the left mandible broader, stouter and bifid.

Maxillæ fringed with stiff, rufous hairs within, edentate, but surmounted with an elongated, slender, articulated hook.

External maxillary palpi four-jointed ; first joint shortest, obconical ; second as long as the third and fourth together, obconico-cylindrical, and with a few stout hairs on the inside ; third joint rather shorter than the fourth, obconical ; fourth joint elongated, subsecuriform.

Internal maxillary palpi two-jointed ; first joint obconico-cylindrical ; second cylindrical, slightly curved, obtuse at tip.

Labial palpi a very little longer than the external maxillaries, four-jointed ; first joint nearly concealed by the mentum, thickest, obconical ; second joint shorter and smaller than the first, obconical ; third joint longest, nearly cylindrical, enlarged a little at the apex, with a few hairs on the inside ; fourth joint shorter than the third, subsecuriform, rather longer and wider than the fourth joint of the external maxillary palpi.

Mentum transverse, rather wide, somewhat concave, deeply emarginated, with the lateral lobes rounded, and with a stout tooth in the middle of the emargination. This tooth is simple at the point, but is grooved on the lower side from the base to the tip.

Thorax more or less cordiform, truncated at base and tip.

Scutellum short, wide, triangular, entirely concealed beneath the hind margin of the thorax.

Elytra united at the suture, together ovate, or oblong-ovate, subacuminate, very obtusely carinated above the lateral margin, inflexed and embracing the sides of the abdomen.

Wings wanting.

Abdomen with from one to three setiferous punctures on each side of the middle of the three intermediate ventral segments; last segment in the female, subacute; in the male very deeply emarginated, and with a supplementary, valvular, deeply emarginated segment, the edge of which projects a little beyond the preceding segment.

Legs. Anterior tibiæ not notched, with a few short bristles, dilated at tip, on the under side of which is a short channel with its sides fringed with short hairs, and the tip armed with two slender, simple spurs. Anterior tarsi in the male with three dilated joints, which are covered with thick-set brushes beneath, and beset with short bristles around the edges (as in *Chlænius*, etc.); first joint triangular, longer than wide; second and third nearly alike in size and form, sub-quadrate, with rounded angles, more prominent within than on the outside, rather wider than the first joint; fourth joint obconical, minute; fifth longer than the fourth, obconical; anterior tarsi of the female without dilated joints, similar to the other tarsi. Intermediate and posterior legs with a few bristles; tibiæ not channelled beneath the apex; tarsi setulose and with obconical, simple joints. Posterior trochanters short, oval. Nails slender, simple. The few characters given by Mr. Say agree in all essential particulars with the above, which contain some that he did not notice.

I consider this genus as properly placed among the *Cicindelidæ*, for these insects differ from all the *Carabidæ* in having an articulated hook at the end of the maxillæ. They should come between *Manticora* and *Megacephala*, being related to both, but coincident with neither of them. Do me the favor, I beg of you, to send me a transcript of the characters of the similar insect which you say Eschscholtz found at New California.

DARLING TO HARRIS.

NEW HAVEN, May 14, 1846.

I have been fortunate enough to take, on the raspberry bushes, a plentiful supply of the new insect *Selandria* (*Hoplocampa*) *rubi*; of which I send you several in a quill. That you may see the manner in which the eggs are deposited, I enclose in the quill (to prevent wilting) a leaf with a number of eggs upon it, or rather in it. The eggs seem to have been placed between the coats of the leaf, by the side of the ribs; and as the eggs increased in size, they have produced an oval expansion of the undercoat, and a discoloration of the cuticle of the upper side, directly over the egg. The larvæ are now beginning to come out on leaves that have a warm exposure, and are near the ground. The winged insect is found resting on the upper side of the leaves. When the leaf is touched the insect falls as if dead, but in two or three seconds takes wing; they are very easily caught.

HARRIS TO LE BARON.

CAMBRIDGE, Sept. 5, 1850.

On the sixth of August I left Cambridge for a visit to the White Mountains, by way of Portland and Fryeburg, and returned on the seventeenth by way of Franconia Notch, Plymouth, Concord and Lowell. In the course of the visit I went to Mount Pleasant, in Denmark, Maine, and passed a night in the house on the top of the mountain, thence through the valley of the Saco to North Conway, where the Northern Kearsarge, or Pequawket Mountain was visited. On going through the White Mountain Notch, from the Willey House,—where a dreadful avalanche or slide destroyed the whole Willey family in August, 1826, filling the whole valley with ruin—it began to rain, and the weather was so unfavorable the next day that I was obliged to give up ascending Mount Washington. It cleared off too late for us to ascend that day, and we concluded to go on to Franconia, where we arrived at night. There we remained two days; some of the party ascended Lafayette, a mountain almost as lofty as Mount Washington, while others of us, myself included, tried the less toilsome and shorter course up the Profile Mountain. As this was my first visit to the mountains, it was greatly enjoyed, although in a scientific way unproductive of results of any importance. Throughout the whole excursion I was struck with the paucity of species of insects observed, with the exception of those of the genus *Bombus*, which were to be seen in great profusion on the Canada thistles. *Antennaria margaritacea* was found in abundance in almost all parts of our route, sometimes covering whole fields with their white flowers, often of immense size and great beauty; but they were without any attractions to the insect tribes, and were rarely touched by them. The fire-weed, *Epilobium spicatum*, threw up a profusion of its showy purple-flowered spikes wherever the wood had been burnt over; but these flowers also harbored very few insects; the golden-rod was just coming into flower in Maine, and in some of the warm valleys in New Hampshire, and where sufficiently expanded had some insect visitors upon it, such as *Lepturæ*, etc. A few specimens of the beautiful northern *Buprestis fasciata* were taken on Pleasant Mountain and on Kearsarge. On an island in the Saco River at North Conway, I found *Amphicoma vulpina*, *Platycerus piceus* and *Cimbex ulmi* ♀, one specimen of each. Three or four *Cicindelæ* were also taken here, two of which were varieties unknown to me, and perhaps new species.

At Bartlett, where we began to ascend the White Mountain Range, the beautiful *Eupatorium ageratoides?* first appeared, and on the flowers, for the first time, was seen the fine *Limenitis Arthemis*, distinguishable even at a distance in flight, by its broad bow on the dark wings. These flowers were found in open places up to the gorge or Notch and along the road on the northwestern descent, and were accompanied by this fine butterfly, which occurred nowhere else, disappearing with the flower in the valleys and plains, and not seen at the Franconia Notch at all. Not having ascended the White Mountains above the region of the trees, I missed obtaining the *Hipparchia* (*Chionobas*) *semidea*, peculiar to this region; nor was it found on the Franconia Mountains. At the latter place, I got specimens of *Eledona cornuta* in tree *Boleti* and *Nitidula grossa* under bark of decayed trees, and was sufficiently bitten with *Simulium molestum*. Every mud-puddle was surrounded by swarms of *Colias Philodice*, and a few insignificant *Hesperiæ* were seen in the meadows. All the way, except among the White Mountains, the note of the *Cicada canicularis* was heard in the day and one specimen was taken on Kearsarge Mountain. In a few places near the mountains the white butterfly, *Pontia oleracea* [Pl. IV, figs. 9–11], was observed hovering on the wild mustard and a single male specimen of the rare and curious *Ægeria caudata* was taken on the blackberry at Jackson, near the falls of the Ellis river, which we visited from North Conway. I caught at Franconia another curious *Ægeria* with pectinated antennæ, new to me, and the type of a new sub-genus. None of the *Cerambycidæ* or *Buprestidæ*, excepting *B. fasciata*, were taken in the journey, although diligently sought for on the trunks of trees, whenever opportunity offered. Almost the only hemipterous insects observed were *Phytocoris linearis*, not excepting *Cimex lectularius*, which never once occurred! Neither *Clerus Nuttallii*, *Pytho nitidus*, *Dendroides canadensis*, nor other northern insects, which were expected to be seen, were found. I searched the flowers of *Clematis virginiana*, which appeared occasionally on the banks of rivers and brooks, but found no specimens of *Cantharis marginata* upon them. Indeed, I never before spent so much time in the open air in the summer, with fewer insect acquisitions. The excursion nevertheless was abundantly enjoyed in other respects; and as the journey from Portland to Franconia was taken in a private carriage, I had opportunity to stop whenever and wherever I wished.

HARRIS TO LE BARON.

CAMBRIDGE, June 23, 1851.

A new insect, allied to *Coccus* and congeneric with the Linnean species of *Chermes*, which do not leap (two or three of which are noticed by Linnæus), has appeared on the Scotch Larch, but has not attacked the American Larch. Hence I infer that it is an imported insect. I have searched in vain for the males. The females, which are very small, lay a considerable number of eggs, attaching them by threads to the leaves and twigs, but they do not brood over them. When these females begin to lay they are covered with a white, flocculent substance; but their form is very different from *Dorthesia* and the allied genera. Reluctant as I am to do so, I shall have to give the insect a new generic name. It seems to be intermediate between *Aphis* and *Coccus*, being wingless like the latter, yet not sedentary and fixed upon its eggs, but having the power of moving about like the *Aphides*. It cannot with any propriety be retained in the genus *Chermes*, from which it differs in all essential characters.

HARRIS TO HIGGINSON.

[Dated a little before the death of Dr. Harris.]

I mourn for the loss of many of the beautiful plants and insects that were once found in this vicinity [Cambridge]. *Clethra*, *Rhodora*, *Sanguinaria*, *Viola debilis*, *V. acuta*, *Dracæna* *borealis*, *Rhexia*, *Cypripedium*, *Corallorhiza verna*, *Orchis spectabilis*, with others of less note, have been rooted out by the so-called hand of improvement. *Cicindela rugifrons*, *Helluo præusta*, *Sphæroderus stenostomus*, *Blethisa quadricollis* (*americana* mî), *Carabus*, *Horia*, which for several years occurred in profusion on the sands beyond Mount Auburn, with others, have entirely disappeared from their ancient haunts, driven away, or exterminated perhaps by the changes effected therein. There may still remain in your vicinity some sequestered spots, congenial to these and other varieties, which may reward the botanist and the entomologist who will search for them carefully. Perhaps you may find there the pretty Coccinella-shaped, silver-margined *Omophron*, or the still rarer *Panagæus fasciatus*, of which I once took two specimens on Wellington Hill, but which I have not seen since.

APPENDICES.

DESCRIPTIONS OF LARVÆ

MEMORANDA OF THEIR METAMORPHOSES,

HABITS, ETC.

Galeruca sp.

Larvæ of nearly full size of *G. vittata?* or *gelatinariæ?* Fabr., or of an allied species, found abundantly on *Ambrosia elatior*, July 30, 1845. They live on the upper surface of the leaves and devour the cuticle and parenchyma above, leaving the lower cuticle untouched. They are sluggish in their motions, and rest extended longitudinally along the ribs of the leaves. They are of a dirty, yellowish white color, blotched at the sides around the upper row of lateral tubercles, and in two rows along the back with pale, bistre black. The head is wax yellow, the last joint of the legs is black, and there is a black spot on the anterior side of the coxæ. They have six legs and an anal proleg. The body is somewhat flattened, or broader than thick, and tapers at each end. On each segment there are two lateral, papillose tubercles, one above and the other below the spiracle, and on the back each segment has two transverse folds beset with minute tubercles. All the tubercles are setiferous. The bristles are whitish, and come out double, being apparently united and slightly enlarged at the tip, so as to form a loop conspicuous at this part. Length one fourth inch.

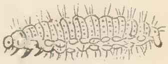


Fig. 33.

Haltica alni Harr. MSS.

In travelling from Centre Harbor, N. H., to Conway, on the second of August, 1854, and from Conway to Upper Bartlett, and subsequently to Jackson, I saw the alders (*Alnus serrulata*) everywhere ravaged by insects which had destroyed their leaves in the manner of canker worms. Upon examination the spoilers were found not to be all dispersed, and several were seen upon the leaves still continuing their work; at the same time were found in Conway numerous beetles, which proved to be a species of *Haltica*, eating the leaves on the same alders. The larvæ which had ravaged these shrubs were doubtless those of the *Haltica* before named. These larvæ, when fully grown, were about half an inch long, nearly cylindrical, livid brown above, paler beneath, with six true legs and an anal proleg. The body tapered somewhat at each extremity. Segments twelve. Fourth and following, each with a transverse, oval, ventral, rough space, forming a series of false abdominal prolegs. Each segment with a double dorsal row of acuminated tubercles, or small points, bearing very short hairs, and a single ventral series on each of the ventral plates. Head, tubercles and true legs black. Lives exposed on leaves of the alder, the substance of which it devours, leaving only the net-work of veins untouched. Conway, August 4th, 1854.

Selandria vitis Harr.

July 29th, 1827. Found the full grown larvæ on the leaves of the grape vine, gregarious, living on the under side of the leaves, and devouring all parts of them, beginning at the edge. Color of larvæ pale yellow, darker or greenish on the back; first three segments, antepenultimate and penultimate deeper yellow; head and tail above black; legs greenish; segments, twelve intermediate, each with two transverse rows of about six black spots tipped with a short, thick, blunt bristle, except the first segment next the head, which has only one row, the other row being incomplete, or wanting the two superior spines. Last segment, or tail, with two spines or blunt bristles. Prolegs fourteen, and a bifid anal one; true legs six, in all twenty-two.

July 3, 1831. Saw the gregarious larvæ feeding beneath the leaves of the grape vine, five or six in a cluster. They eat the vine leaf, nervures and tendrils, from the edge down to the peduncle. At the same time discovered what I supposed to be the perfect insects on the leaves. Propedes sixteen, true feet six, in all twenty-two feet. Length half an inch; above pale bluish green, except the thoracic segments and posterior half of the antepenultimate with the anterior half of the penultimate leg-bearing segments, which are pale yellow; body beneath pale yellow or greenish. Head black; two rows of spiniferous tubercles (six in each transverse row) across each segment; the tubercles black and produced into an acute, short, black spine. Tip of last segment above anal prolegs black. Larva and imago, July 20, 1827, July 24—Aug. 4, 1832. ♂ five twentieths of an inch. ♀ three tenths.

Selandria rosæ Harr.

May 24th, found flies on rose bush. June 22d, found slugs on the same; probably hatched two or three days. July 8th, larvæ disappeared. July

9th, other larvæ on other plants in various stages, but most nearly grown. They eat the upper surface of the leaf in large patches, leaving the veins and lower cuticle untouched. Legs twenty-two, viz., six true legs and sixteen prolegs. Body soft, semitransparent green above, pale (yellowish) at sides and below, transversely wrinkled on back, which is also rough with little sharp asperities. On the anterior edge of the first ring are two little trifid tubercles. The head is round, pale yellow, with a black eye-like spot on each side. Length rather over four tenths of an inch. When about to be transformed, they become entirely light yellowish, and lose their semitransparent appearance. This occurred with some July 10th.

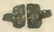
Allantus sambuci Harr., Catal. [**Macrophya tibiata** Norton.]

Found on the elder, June 12, 1828. Length about one inch. Segments twelve, besides the head. Legs twenty-two. Pale yellow, transversely wrinkled, and covered above with a primrose white coat. Vertex with a quadrate, blackish spot; cheeks each with a circular dark spot; mouth dark or blackish; true legs each with two piceous spots near the coxæ. Each of the first three segments of the body, and also the last segment, with one black dot on each side; the nine remaining, intermediate segments, each with two black lateral dots. Curls around when disturbed. Young larvæ not so hoary, and segments not spotted.

Cocoon in the earth, June 15, 1828. Winged insects, ♂ and ♀, in abundance on the elders, June 1, 1829—1831.

Sept. 15, 1827. On *Cornus sericea*, covered with a thick, white substance. In its last state this white substance disappears, and it becomes pale yellow, with a black head, and four rows of black spots, quadrate, two dorsal and one lateral. Prolegs sixteen, corneous legs six = 22. Forms a cocoon.

Sept. 10, 1849. Lives in swarms on the under side of the leaves; when at rest curled spirally, head outwards, tail inwards and upwards. Length of largest one inch and one tenth. Legs twenty-two; none to fourth segment, the anal pair shortest and feeble. Body yellow, covered above with a white efflorescence, and transversely wrinkled between the sections. Head black, except the lip and mandibles, which are yellowish. A black spot on tip of anal clappet. Body beneath citron yellow, immaculate and bare. Curls the tail from time to time in walking and resting, so as to hold on the better. Spiracles eighteen, none on second, third and twelfth segments.

Sept. 11, 1849. Three of these larvæ had moulted, and lost also their white efflorescence, and were greatly reduced in size; length only between seven and eight tenths of an inch. Head black; body yellow, spotted above with black in four dorsal rows, the two middle rows of quadrate black spots, of which there are four on each segment, two and two, and the lateral rows, each of much larger, transverse, quadrate spots, one to each segment on each side. Anal clappet with four spots, thus: 

Nematus ventralis Say.

June 22d. Found the larva on the willow. Head deep black, polished; body blue-black, with lateral series of ten large, fulvous spots. True legs six, prolegs six intermediate pairs, and one terminal pair, or twenty in all. Last segment with two very short, terminal styles. Raises the tail when disturbed.

Cocoons formed June 24. The perfect insect began to come out July 15th, and afterwards; and at the same time an Ichneumon (*I. mellipectorius* Say MSS.).

Found a swarm of larvæ on weeping willow Oct. 17, 1846.

Found on narrow leaved dwarf willow, near Fresh Pond, Sept. 5, 1841; also found on same shrub a pair of the winged insects apparently recently transformed. Larva six tenths of an inch long, greenish black, and with ten heart shaped, ochre yellow spots on each side, beginning on the second ring. Prolegs fourteen, viz., twelve ventral, and two very short, retractile ones to the last ring, all of a whitish color; the first pair on the fifth ring, and the rest (except the anal pair) on the following rings. Body transversely wrinkled, but smooth. Head polished, jet black; anal segment (just above the flap) with two minute, black warts, or truncated, slender tubercles. Curls its tail when at rest. They died without change.

Found another on willow, Sept. 19. It made a cocoon in a leaf, Sept. 20.

Papilio Asterias Cramer.

Caterpillars on the parsley and conium.

Larva green, banded with black, the bands spotted with yellow, found on Cicuta. When touched, the larva projects a pair of soft orange colored antennæ from the front part of the body, which at other times are drawn in and concealed. These organs emit a strong, disagreeable smell. The larva eats voraciously a few days before it suspends itself, and then discharges a great quantity of watery fæcal matter, shrinks in size, and wanders up the side of the box in which it is kept, fixes its tail and fastens a band across its body. The young larvæ of the second brood were found Sept. 16, 1839, feeding on *Conium maculatum*. Length one half inch, another one fourth inch.

Head black, spotted with white (a white spot on front, two spots on vertex, and one on each side). Body black, with a broad, white, transverse band on the sixth and seventh segments; six black tubercles on each segment encircled with orange, the lower ones forming a series of larger orange spots on each side, below which is a lateral series of small white spots; a transverse white spot on the tail, and two white spots on the hind part of the first segment. The tubercles produce very short bristles.

The imago was observed May 29, 1821, June 1, 1835, June 15, 1828 and 1829, June 25, 1820, July 21, 1825, July 24, 1825, July 25, 1825, Aug. 2, 1825, Aug. 1, 1838 and 1839, Aug. 10, 1837, Aug. 15, 1835, Sept. 1, 1839.

Larva suspended.	*Exuviæ cast.*	*Imago.*	*Chrysalis state.*
July 18, 6 A. M.	July 19.	♀ July 31, 2 P. M.	12 days.
“ 20.	“ 21.	♂ Aug. 2.	14 “
“ 10.	“ 11.	July 21, A. M.	10 “
“ 11.	“ 11.	“ “ “	10 “
“ 11, P. M.	“ 13.	“ 21, “	8 “
“ 13, “	“ 13.	♀ “ 24, “	11 “
“ 15, “	“ 16.	♀ “ 25, “	9 “

Ichneumon, parasitic in the caterpillar of *Papilio Asterias.*

Caterpillar suspended.	*Exuviæ cast.*	*Parasite escaped.*	*Chrysalis state.*
July 9.	July 10.	July 31.	21 days.
“ 12.	“ 13.	Aug. 4.	22 “
“ 13, 4 A. M.	“ 14, 4½ P. M.	“ 4.	21 “
“ 19.	“ 20.	“ 12.	24 “
“ 15, P. M.	“ 16.	“ 15.	30 “
Autumn of 1820.		May 27.	All winter.

Papilio Troilus Linn. [Pl. II, fig. 1, and Pl. IV, fig. 16.]

Aug. 31, 1822. Larva feeds on the leaves of sassafras. When small it is of a blackish color, with a white line on the side. Several larvæ of different sizes and ages were kept to observe their changes.

1. Small blackish larvæ. [Pl. IV, fig. 16.] Sept. 3, 1822, some of them changed their skins and became green. Sept. 12, one of these green ones changed its skin, and became yellowish. Sept. 13, this one was suspended at night. Sept. 14, became a chrysalis early in the morning. June 7, 1823, imago.

2. Sept. 14 (all my small, dark caterpillars had become green), green larva became yellow. Sept. 15, yellow larva suspended. Sept. 16, became a chrysalis of a green color in the middle of the forenoon. June 20, 1823, imago.

3. Sept. 15, a green caterpillar became yellow. Sept. 16, suspended. Sept. 17, chrysalis of a brown color. June 16, 1823, imago.

4. Sept. 16, a green larva became yellow this morning. Sept. 17, suspended. Sept. 20, chrysalis of a brown color. June 18, 1823, imago.

5. Sept. 20, green larva became yellow this morning. Sept. 21, suspended. Sept. 25, green chrysalis. June 24, 1823, butterfly.

6. Sept. 21, green caterpillar became yellow. Sept. 22, suspended. Sept. 26, green chrysalis. June 24, 1823, imago.

7. Sept. 23, green larva became yellow. Sept. 24, suspended on a leaf. Sept. 27, green chrysalis in the morning.

8. Sept. 23, green caterpillar became yellow. Sept. 25, suspended this afternoon. Sept. 27, brown chrysalis. June 20, 1823, imago.

9. Sept. 14, blackish larva becomes green. Sept. 27, green larva becomes yellow. Sept. 28, suspended this afternoon. Sept. 30; chrysalis in the morning. July 3, 1823, this became a butterfly, and was the last one.

10. Sept. 14, small, blackish larva on the tree. Sept. 25, became green in the morning, showed its scent organs. Oct. 11, changed and became yellow. Oct. 12, suspended. Oct. 17, chrysalis in the morning. June 25, 1823, imago.

1	2	3	4	5	6	7	8	9	10	Caterpillars were probably 3 or 4 days old when found.
								11	11	Number of days black in the house.
9	11?	12½						13	16	Number of days green.
1	1	1	1	1½	1	1	2½	1½	1	Number of days yellow.
1½	1½	1	3	3½	3½	3	1¾	1½		Number of days suspended.

Chrysalis state lasts all winter; butterflies June 16th to July 3d.

August 15, 1823. Found larva on a sassafras leaf. Color olive on the back; two black ocelli on the third segment, four small orange colored spots placed two and two, with a central blue dot in each, the two anterior between the black ocelli and adjoining them, and the others behind them. Back with about eight blue dots, two and two; sides and tail whitish; head pea green; a more dilated white spot behind each side of the enlargement of the anterior part of the body.

Aug. 23 and 24, remains at rest without eating. Aug. 25, A. M., had taken its green color, having thrown off its dark coat the night previous. Sept. 14, began to grow yellow. Sept. 15, remained at rest all day.

Aug. 7, 1827. Found the larvæ on the sassafras, two of them green, one smaller, bronzed olive [Pl. II, fig. 1], and one very small, blackish, with white oblique lines. [Pl. IV, fig. 16.]

1. Aug. 11, P. M., largest became orange-colored. Aug. 12, A. M., suspended. Aug. 13, A. M., chrysalis.

2. Aug. 12, changed to an orange color. Aug. 12, olive color changed to green.

Papilio Philenor Drury.

These caterpillars were only a few days old (probably not more than two days), and were just changing their skins for the first time. The remains of the eggs were seen fixed to the petiole of the leaf, and the caterpillars had only eaten a part of the leaf, beneath which they lived. The small ones were dark brown, without spots, the head and feet black, and differed from the others only in having shorter tubercular projections. Those which had changed their first skins were deep chestnut brown and shining, with the dorsal tubercles on the sixth, seventh, eighth and ninth segments of an orange color, the two tubercles on the first segment rather longer than those on the other segments, but not very much longer than the lateral tubercles on the second, third and fifth segments, the tubercles on the last three segments of the body rather longer than those preceding them, and as well as the other elongated tubercles somewhat pointed, while all the short tubercles were obtuse and wart-like.

Between the 5th of August, and the 23d of the same month, these caterpillars twice changed their skins, and underwent considerable changes in the color and proportions of the tubercles. After the first moulting the tubercles of the posterior part of the body, and the lateral tubercles on the second, third and fifth segments became proportionally longer than at first, and the two tubercles on the first segment were still longer, and projected laterally and anteriorly, like horns; a distinct orange colored spot was visible between them, marking the orifice of the forked osmaterium, which, however, did not seem to be capable of being thrust forth. In a few days more, however, on very rough handling, the caterpillars showed their scent organs a little. This took place at the age of about a week, and then the dorsal tubercles on all the segments began to be very slightly tinged with orange at the base, more distinctly before than behind.

On the 23d of August, the largest caterpillars measured, when at rest, an inch and seven eighths in length; all the dorsal tubercles were orange colored, but those of the tenth, eleventh and twelfth segments were black at the tips; the short lateral tubercles of the fourth segment were also orange colored. Abbot's figure (Insects of Georgia, Tab. III) may be considered as quite correctly representing the caterpillar at this age, except that the last pair of dorsal tubercles should have been curved backwards and laterally; the tubercles also are not colored of a deep orange, as in nature, and the yellowish, or orange colored, transverse spot on the first segment should have been placed close to the head, and between the horns instead of behind the latter.

The insect at this age (probably about twenty days old) may be thus described: — Caterpillar deep chestnut brown, smooth and shining, in some lights changing to velvety black; with a single pair of long, slender and tapering horns on the first segment, directed forwards and outwards, and used as tractors when the insect moves, being alternately applied to the surface to feel the way; a double dorsal series of orange-colored tubercles from the second to the last segment, short, obtuse and wart-like, except those on the tenth, eleventh and twelfth segments, which are longest, pointed, curved and tipped with brown. On the second, third and fifth segments, on each side just above the line of the spiracles, an elongated, nearly filiform tubercle, or short horn, of a brown color, and curved downwards towards the feet; on the fourth segment a lateral wart-like tubercle of an orange color, and corresponding with this, on the remaining segments (sixth to tenth) a lateral orange-colored spot. Above the insertion of each of the prolegs (except the terminal pair) an elongated, pointed and slightly curved tubercle, and similar ones also on the tenth and eleventh segments, rather longer than those preceding them.

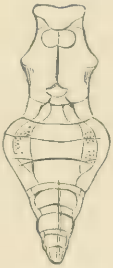


Fig. 37.

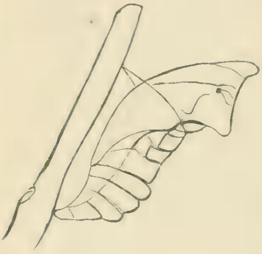


Fig. 38.

The first pair of elongated tubercles are rather soft and very movable, particularly at the base, and as stated before, are used as feelers; all the others are destitute of any independent mobility.

On the 21st of August a caterpillar was found on the Aristolochia, much larger than the foregoing; this one suspended itself on the 22d, and was transformed to a chrysalis on the 23d of August, 1840; and the butterfly (♀) came out Sept. 16th, 1840; chrysalis twenty-four days.

August 25. Five of these caterpillars were suspended in the morning, and became chrysalids by the morning of the 27th; while others are also suspended, and the the remainder preparing to fix themselves on the 27th; all were transformed to chrysalids before the 5th of September, 1840.

Color of Chrysalis.	*Imago.*	*Chrysalis state.*	*Sex.*
Green.	Sept. 21.	25 days.	♂.
Red.	" 22.	25 or 27 "	♂.
"	" 22.	" "	♀.
"	" 23.	27 "	♂.
"	" 23.	27 "	♂.
?	" 24.	? "	♂.
?	" 28.	24 or 25 "	♂.
?	" 28.	" "	♀.
?	" 29.	25? "	?.

Polyommatus Comyntas Godart.

Aug. 8, 1830. Found two larvæ solitary, on the heads of *Lespedeza capitata.* Body elliptical, convex above, flat beneath; segments distinct, granulated minutely; color pale green; a dorsal, dark green line, two lateral ones each side of it, midway between the dorsal lines and the sides, of a paler, less conspicuous green; lateral margins reddish, forming a lateral reddish line. First and last segments paler, reddish, the former hooding and concealing the head in repose. Head very small, shining black, retractile. Feet sixteen, but very small, and with the under side of body uniform pale green. The body is covered with short, erect, minute hairs. Length forty-four hundredths of an inch. It carries a silken line when it moves.

Aug. 13, A. M. Found that one had just become a pupa, lying on its flattish belly, with a transverse band of little threads; it was also fastened by the tail. The other had formed its band, but was not metamorphosed.

Aug. 15, A. M. The second became a pupa. Body short, obtuse at both ends; very pale green, covered with long, erect, white hairs, spotted minutely with blackish; a dorsal row of large, conspicuous, black spots, contiguous towards the head, a lateral one each side, not extending quite to the head. Wing thecæ with about three, longitudinal, narrow bands of blackish, which, from the disposition of the wing cases, are oblique with respect to the body, extending from the shoulders towards the back, or from below upwards and backwards. The body is slightly contracted laterally before the middle, broadest behind the middle, more obtuse before than behind, and the thorax projects slightly above. It is fastened by the tail, and by several transverse threads, which are across the body before the middle. Length almost three tenths of an inch.

Aug. 20, changed its colors. Aug. 22, A. M., became perfect insect.

The second one changed its colors Aug. 24, becoming much darker and almost black, except at the margins of the wing cases. Aug. 26, became perfect insect; pupa state from nine to eleven days.

Imago observed March 20, 1825, Aug. 22, 1830, June 1, 1833, July 15, 1833 and Aug. 1, 1833.

Danais Archippus Fabr.

June 28. One very small larva and two larger ones, found on the blossoms of *Asclepias syriaca.* Colors the same as in the full grown larva.

July 5. The smallest one was half an inch long, the largest about one inch. July 6–8. Two larvæ were hatched from the eggs. This insect appears to live about fourteen days in the larval state, and casts its skin three times.

Became Chrysalis.	*Colors changed.*	*Imago.*	*Chrysalis state.*	*Sex.*
July 13.	July 21.	July 22.	10 days.	♀.
" 13, night.	" 22.	" 23.	10 "	♂.
" 16 "	" 25.	" 25.	9 "	♀.
" 20, P. M.	" 31.	Aug. 1.	12 "	♀.
" 21, "	Aug. 1.	" 2.	12 "	♀.
" 11.		July 22.	11 "	
" 28.	Aug. 10.	Aug. 12.	15 "	
Aug. 4.		" 16.	12 "	

Three continued pupæ only ten days, but this was during exceedingly hot weather. The other two remained pupæ just twelve days, the weather being milder. It is worthy of remark that this butterfly, like many others, came out between seven and ten o'clock A. M.

Limenitis Ursula Fabr. [Pl. IV, fig. 15.]

Larva found feeding on leaves of shrub-oak, June 1; head tinged with pale purple, two white stripes down the centre of the face, lip brownish; vertex bifid, tuberculated, tubercles pale green. Body elongated, cylindrical, a pair of tubercles on each segment, those on the second being much elongated, linear, with short, blunt spines; first and second segments pale reddish yellow, tubercles dirty green; third segment whitish or reddish white, veined with pale green above, tubercles pale; fourth segment green above, tinged with ochreous, especially at sides; fifth segment pale olive green above, darker at sides, tubercles whitish, tranverse elevated line at side whitish, as it is in all the following segments; sixth segment olive green, with two longitudinal white lines above; seventh segment olive green at sides, reddish white or clay colored behind, and on the top two white lines with a clay colored patch between, a small blackish spot near the stigma; eighth segment clay colored, slightly green at sides behind; ninth segment greenish at sides, with a small black spot, clay colored above, before with two white lines; tenth and eleventh segments dark olive green, tubercles paler; twelfth segment dark green above, tubercles four, ochreous. Feet ochreous; prolegs greenish bordered with ochreous. Body beneath whitish varied with green. Length one and three tenths inches.

Pupa, June 7; suspended by tail vertically. Imago, June 18.

June 17, found a young larva on an apple tree leaf, attached to a strong web. It was not more than six tenths of an inch long, of a brown color above, whitish beneath, with an oblong, triangular, whitish patch on the back from seventh to tenth segments; two little blackish tubercles beset with very short spines on the top of the second segment; the head of a paler brown color, heart shaped above, and much larger than the second segment, beset around the sides with little tubercles. This larva was very sluggish, ate very little and grew slowly; on July 6, it had grown to the length of one and one fourth inches; the tubercles after the first moult (since its captivity) have become elongated; the top of the second segment has become distinctly pale or whitish, and the white patch on the back is larger; there is a whitish, elongated triangle extending along the sides of the hinder extremity, from the hindmost feet to the side above the penultimate feet; there are oblong tubercles or elevations in pairs on the top of the third, fifth, tenth and eleventh segments.

Pupa, July 8. Imago, July 20.

Cynthia Cardui Linn. [Pl. I, figs. 1, 2.]

About the last of June and first of July, 1830, numerous larvæ of various sizes were observed on the *Onopordon acanthium*, on the *Cnicus benedictus* (two kinds of thistle), and on the garden hollyhock. These larvæ bore a general resemblance to each other in form, etc., though varying much in colors. Their habits were the same. They spin a thin web on the surface of the leaf, which they draw over by means of the threads of silk which are attached to the edges, thus forming a kind of tent within which the larvæ feed on the upper surface and parenchyma of the leaf without touching the under cuticle. When this is exhausted the larva leaves its tent and forms another in the same way. Very small larvæ only cover themselves with a portion of the leaves, and are principally protected by means of a silken tent. The larvæ live separately, but many are found on the same plant.

July 5. Two full-grown larvæ of the *Cnicus* suspended themselves by the tail; their colors were so much changed as to be indistinct. These larvæ had fed equally well upon leaves of the *Onopordon*. A third prepared to suspend itself at the same time. It was one inch and a half long. The head piceous black, slightly indented above or heart shaped; the body of a dirty white color, ornamented above with small, deep black and larger, confluent, yellow spots, the former running together so as to produce a dorsal line, and the latter forming an interrupted lateral line, and two similar but narrower dorsal lines upon each side of the black dorsal line. A broad, blackish, lateral streak on the first four segments just between the first and second series of lateral spines. Each segment with a transverse series of spine-bearing tubercles. The tubercles of a pale reddish color, the spines branched, white, tipped with blackish. Except on the first three segments (where the dorsal spines and tubercles are wanting) there are seven spines on each segment; one dorsal, and on each side two lateral, above the stigma, and one below the stigma on the lateral yellow line. Below this last is another tubercle in most segments, which is tipped with hairs only. The feet are pale reddish or ochreous. The body beneath, whitish, spotted with black. There are numerous, short, whitish hairs or bristles on the head and body. In many of these larvæ there is a blackish lateral line above the yellow one, and a large blackish spot surrounding a smaller yellow one in front of the upper lateral spine. The yellow color frequently forms small transverse lines, especially on the margins of the segments above. The younger the larvæ the more does the black color prevail, so that it appears to constitute the prevailing hue of the youngest larvæ.

No perceptible difference was observed in larvæ from the *Cnicus* and *Onopordon*, except that the full-grown ones of the latter had less black about them, so that the dirty bluish white color of the body was more prevalent and observable. In small larvæ of the thistle several days old and about four tenths of an inch long, the whole body, head, spines and feet, were black, but there was a faint yellowish spot around the first lateral spine (or tubercle) of the fifth, seventh, and ninth segments. As the larva grows older these appear like six yellow spots; afterwards there are spots around the dorsal tubercles in the same segments, and the spines from each of these yellow tubercles become yellow also, and there is a yellowish, interrupted, lateral line upon the fourth and remaining segments. The larva has then become more than half an inch long. After another sloughing the dorsal yellow lines appear, and there are a few yellowish spots on the posterior half of the body. After every successive change of skin the larva becomes lighter, till at length it assumes the hues of the full-grown insect before described.

A larva on a hollyhock about to suspend itself exhibited transverse, bluish white bands across each segment, on which the spines were situated, the tubercles of which were not reddish, but pale blue. The longitudinal, dorsal, yellow lines obsolete. Two transverse ochreous bands between each segment and a little spot of the same color in front of each lateral tubercle.

Found a larva on the leaf of a sunflower, Aug., 1822, from which my drawing was made. [Pl: I, figs. 1, 2.]

Head black, with white hairs; middle of the back with a yellowish line in which are situated white, branched spines tipped with black; each side of the yellow line a row of yellow tubercles with branched spines upon the edge of a black line; just below, upon the lower edge of this black line, is another row of branched spines, which is wide, and upon the upper edge another narrow yellow line; then a narrow blackish line, in which are the spiracles, which are black within, a lighter color encircling them; next a yellow line, brighter than the former, with tubercles and white spines, not tipped with black; next is the belly, of a light ash color, and hairy; feet light ochreous yellow; tip of tail black; true feet ferruginous, tipped with black. First three segments more ashy colored than the rest of the body. Thus it has one dorsal and, on each side, three lateral rows of branched spines.

Suspended Aug. 23, 1822. Chrysalis Aug. 24. Chrysalis yellowish brown; head squarish or but slightly indented; two eminences each side, brassy; two smaller, like eyes, brassy; nose-like prominence, antennæ cases, and some stripes between them, brassy; four dots between antennæ (two on each side) and four or five on each wing case, black; one large and one very small tubercle under chin, one row in middle of the back, and one on each side of larger tubercles, brassy; wing cases with an oval brassy spot and eye. Tail with a black line.

July 5. Three nearly grown larvæ of the hollyhock resemble very closely in color the paler ones of the *Onopordon*.

July 5, P. M. Two (on the *Cnicus*) suspended. July 17, A. M. Two imagines. Between the 6th and 12th of July many larvæ of the *Cnicus*, *Onopordon* and hollyhock were suspended, and became pupæ.

Imagines appeared May 10, July 17, A. M., July 18, A. M., July 19, A. M., July 21, P. M., Aug. 1.

Cynthia Atalanta Linn.

Found July 9, 1828, on the nettle. It forms a slight web on the upper surface of the leaf, and then approximates the two sides so as to conceal itself entirely. In eating it devours the leaf, beginning at the apex, and as it gradually consumes its habitation, it is forced to betake itself to a new leaf, within which it again conceals itself. The larvæ differ in color from those described by De Geer, who said they were black.

1. Pale snuff colored, with confluent, sulphur colored spots; a lateral series of lunate, sulphur colored spots. Spines branched, luteous, seven in each segment except the first; this and the head have a transverse series of small, acuminated tubercles. The head is cordiform, or bifid above, color black, setiferous points or tubercles white, among which are a few black ones. Feet blackish. Prolegs brownish.

2. Rich deep purple brown; lunules white; head brownish, or purple black; spines yellowish white. Spots on body white. Suspended July 13, 1828. Chrysalis next morning. Winged July 24, 1828.

3. Colors same, except those of fourth spine of second segment, which are black. Suspended July 15. Chrysalis July 16. Winged July 26, 1828. Length of larva when fully grown nearly one and one half inches.

The chrysalis state continues ten days. The larva, when suspended, is more curved than most others, the head nearly reaching the tail.

Observed the imago May 10, 1825, Sept. 15, 1825, July 1, 1833, Aug. 6, 1839.

Vanessa Antiopa Linn.

Description of caterpillar, June 21, 1839. Black, minutely dotted with white, and with a row of eight dorsal, dark brick red spots; prolegs (except the anal pair) dark rufous. Length one inch and a half to one and three fourths.

Head and body slightly pubescent, with short, white hairs; head heart shaped, longitudinally furrowed before, and scabrous, particularly above, with acuminated tubercles; first segment unarmed; second and third segments each with four black, slightly branched spines; fourth and fifth each with six spines; sixth, seventh, eighth, ninth and tenth, each with seven spines, the dorsal one becoming gradually larger behind, till it equals the lateral spines in size and length; eleventh segment with three transverse series, each containing two spines; a rufous, or dark brick red spot on the top of each of the segments, from the third to the tenth inclusive; prolegs dark rufous, except the anal pair, which is black, with a pale rufous terminal coronet. Feeds on *Ulmus americana.*

June 18, 1820. Found the caterpillars. June 19, one had ceased eating; June 20, A. M., it had suspended itself by the tail to a web of the circumference of a dollar, so as to hang with the body vertical, but the head and anterior rings crooked upwards like a hook. June 21, became a chrysalis.

June 24, A. M., another fixed its tail, and by noon was suspended. June 25; no change was perceived this morning, but at five P. M. the exuviæ were cast off, and it appeared in the chrysalis state. Imago, July 6.

June 25, A. M., another was suspended. June 26, A. M., had cast its exuviæ. Imago July 7, 6 o'clock A. M.

June 28, a third found suspended, and exuviæ cast. July 9, imago. The average number of days it remains a chrysalis is eleven or twelve. The butterflies seen last of March, all April and May, 1820, March 1, 1825, March 25, 1828, and in the crevices of stone heaps in the fields in the winter.

Vanessa Progne Fabr.

Found a yellow caterpillar with branched spines, which were white tipped with black; near the fifth, sixth, seventh and eighth spiracles, surrounding the base of the second lateral series of spines, an ochreous spot. Suspended itself by the tail Aug. 21, 1825. Became pupa Aug. 23. Imago, Sept. 8, 1825 (A. M.). Chrysalis state sixteen days.

Larva on American elm. Suspended Aug. 22, A. M. Chrysalis Aug. 22, P. M.

Vanessa C. aureum Fabr.

Found the caterpillars plentiful on the hop vine, and also on the elm in August. Color ferruginous, varied with black and yellowish white spots;

spiracles black; head red; two spines on the head, four on the second segment and two on the last, black; the remaining spines whitish, tipped with black; all but one of these larvæ became pupæ on Aug. 25.

Another caterpillar differing a little from the preceding, with yellow or ferruginous spines. The number of days this species remains in the pupa state is from eleven to fourteen. Chrysalis with a very large and thin, nose-like projection, and eight silvery spots on the body.

Larva suspended.	*Chrysalis.*	*Imago.*
Sept. 28, 1820.	Sept. 30, 4 P. M.	Oct. 26, A. M.
Aug. 21, 1825.	Aug. 22.	Sept. 8.
	" 25.	" 8.
	" 14.	Aug. 15.

Imago observed Oct. 1, 1820, Sept. 1, 1827, May 1, 1828, Aug. 1, 1834, Oct. 10, 1836, Aug. 1, 1839.

Hesperia sp.

July, 1830. Found three larvæ on the *Lespedeza capitata*; solitary, folding and fastening the leaves with silk. Head large, round; flattened anteriorly and behind slightly cordate, or indented on the vertex; blackish, granulated, hairy, without visible eyes. First segment, representing the neck, with a narrow, transverse, blackish line. Body pale green, granulated, with very short erect hairs; a pale longitudinal line each side of the back, from neck to tail, and an inconspicuous, darkish green, dorsal line. First pair of feet black, remaining ones green. Length six tenths of an inch.

By the last of July, one of them had become pale reddish, with very minute blackish dots, a dark dorsal line of contiguous blackish dots, and a pale reddish, lateral one, immaculate. Neck with a transverse black band. Head and first pair of feet black. Length nearly one inch.

Smerinthus juglandis Sm.-Abb.

In July, 1827, found a larva on the black walnut resembling Abbot's figure in some respects. Head acuminated and minutely bifid above; body very small before, thick in the middle, gradually smaller behind, pale blue green, covered or rugose with minute tubercles or granulations, which at the sides are in a regular series corresponding with the oblique, whitish lines; these white lines are formed rather by a series of granulations more white than the rest; tail rugose also. This larva resembles somewhat that of *Smerinthus myops* Sm.-Abbot. It is remarkable for the squeaking sound which it emits, apparently by rubbing the rings of the anterior part of the body together. Entered the earth Aug. 7, 1828.

Ceratomia quadricornis Harr.

Eggs hatched July 31, 1849. They are nearly of a compressed spheroidal shape, green, and with very fine reticulations. The caterpillars, when first hatched, are yellowish green, with a darker dorsal line, a long, red, caudal horn and a very large, green head, with the dorsal denticulations and tubercles obsolete. Pupa thick, not elongated before; tail ending with a conical projection, tipped with two little divaricating spines; tongue case buried and soldered to the breast.

Sphinx cinerea Harr. [Pl. II, fig. 6.]

Larva found on the lilac bush in July and August. Body bright pea green. Head blue green, with two longitudinal, paler bands; fourth to tenth segments with an oblique line each side, converging behind and above, of a bright yellow color, margined above with clear blue; the yellow lines are continued from the tenth segment upon the eleventh, till they meet the base of the horn which arms the latter; the horn is of moderate length, and curving downwards at tip, of a pale blue color with raised points, above of a dark blue; triangular anal plate tumid, and as well as the lateral plates, covered with elevated black points; feet bluish, black at tips; prolegs green, blackish at tips; spiracles orange colored. Length two to three inches.

Pupa in earth, August 15th; has the tongue case exserted, and lying freely beneath the thorax; it is longer in proportion than in that of *S. Gordius* Cr., and is swelled and slightly bifid at tip.

Imago, July 1–10 from pupa; taken winged, August 20.

Sphinx convolvuli Sm.-Abb.

Larva found on morning-glory, Aug. 6, 1841. Form and general appearance like that of *S. Ligustri.* Pea green, paler or more yellowish on the back. Head striped on each side with brown. Two longitudinal, chain-like stripes on the back, of a brown color, meeting at the caudal horn; seven oblique brown stripes on each side, bordered below with cream color; spiracles in the centre of an oval brown spot which is edged with cream color, and united before with the oblique bands; legs, tips of the prolegs, and the caudal horn, brown; anal triangle edged with pale yellow.

Buried itself in the earth Aug. 14, 1841. Came out Sept. 25, at eight P. M. Cocoon from forty to forty-two days, probably only forty.

Sphinx carolina Linn.

Larva taken on potato, Aug. 18, 1821, Aug. 9, 1849. Pale bluish green, with transverse wrinkles; seven oblique white lines, margined above with darker blue green; caudal horn blue, tipped with brown; anal clappet and side valves minutely granulated, and edged behind with yellowish green. Head oval, with two white vittæ. Prolegs pink.

Some entered the earth Sept. 1, 1821.

Found on tomato, Oct. 16, 1844. Dark olive green, with seven oblique, white, lateral bands. Head and top of first segment pea green, the latter with two small blackish spots above (perhaps accidental, or the effect of frost). Triangular tail-piece edged with whitish, and with three blackish spots above. Segment minutely, transversely wrinkled, and the second and third segments above minutely dotted with yellow granulations. Caudal horn black, granulated. Legs black. Prolegs rather paler than the body. Spiracles black. Head immaculate, smooth.

Philampelus Achemon Drury [Pl. III, fig. 11]. **P. Satellitia** Linn.

These Sphinges were raised in pots half full of earth, but the chalk numbers on the pots became effaced afterwards, so that it was impossible to discriminate the species.

The brown larva [Pl. III, fig. 11] was drawn Aug. 6, 1821. It went into the earth Aug. 11. It feeds on the grape vine leaves, and when young has a deciduous tail, which is curled over the back like that of some dogs, but is shed before the insect is half grown.

Another entered the earth and became a pupa Aug. 10–11, 1821.

Others found with only five lateral yellow spots. They entered the earth in August, and became pupæ on the 17th of Aug.; others on July 28 and 30.

Chœrocampa pampinatrix Sm.-Abb. [Pl. I, fig. 10.]

Larva found on grape vine leaves; one specimen concealed itself in a dried leaf on the surface of the earth, when about to change to a pupa.

Larva found.	*Entered the earth.*	*Pupa.*	*Imago.*
July 31, 1821.	Aug. 3.	Aug. 6.	Aug. 29, 1821.
“ “	“	“ 7.	“ “
Aug. 30, 1821.	Sept. 1.		July 19, 1822.
Sept. 8, 1821.			
Aug. 1, 1823.	Aug. 10.		

Chœrocampa chœrilus Cramer.

Oct. 5, 1843. Larvæ exactly resembling Abbot's figure of *S. azaleæ* Sm. were found Oct. 10. Made cocoons of a few threads, bits of leaves, and two days afterwards were changed to pupæ.

July 27, 1850. Found under *Tradescantia virginica*, on the ground; general color claret red above; head greenish, tinged with red, and rough with elevated points; first three segments pale, immaculate, retractile; a dark reddish dorsal line, and body above sprinkled with purple white dots; oblique lines, and elongated posterior lines, ending at root of tail, purplish white; body beneath very pale purple; tail short, straight, pale blue, and rough with minute, blackish points. July 28, made its cocoon on top of earth in pot; winged July 3, 1851.

Thyreus Abbotii Swains. [Pl. III, fig. 1.]

Found the larva on the ground near grape vines and currant bushes. The drawing made Aug. 11, 1821; after which the insect escaped from the pot where it had been placed. Two young ones of a greenish white color, found on the *Ampelopsis quinquefolia* by Rev. Thomas Hill, were brought to me June 26, 1854. They were one inch and one tenth long, of a whitish color, transversely wrinkled, with a row of black dots on the back (one on top of each segment), and a rounded, prominent tubercle on top of the eleventh segment, of a deep yellow or pale orange color, semitransparent and polished, and nearly encircled at base with a deep black line. Prolegs not perceptibly unequal. Motion not semigeometrical. July 1st, these larvæ cast their skins. They grew well, eating voraciously. Attitude at rest stretched at full length, not sphingoid. Body nearly cylindrical, not flattened at sides, not colored with large black spots beneath, gait regular and slow in creeping,—not looping at all.

July 5th, Mr. Hill brought me four more large larvæ similar to the first two in their present dress, but larger in size, also one other of the same form and size, also with a similar tubercle on eleventh segment, but having green spots on back and sides. The green-spotted one went into the ground the 8th of July. The others without change ceased eating between the 10th and 13th of July. Chrysalis on top of ground, July 14th; three others on the 15th.

Ægeria cucurbitæ Harr.

Found summer and winter near the roots of squash vines and also in the roots.

Aug. 15, 1841, fully grown larva. Somewhat depressed, fleshy, soft, tapering at each extremity; segments, ten in number, very distinct, the incisions being deep; the eleventh or last segment minute and hardly distinct from the tenth. Head retractile, small, brown, paler on the front, and with the usual V-like mark on it. First segment or collar with two oblique brown marks on the top, converging behind. A dark line occasioned by the dorsal vessel seen through the transparent skin along the top of the back, from the fourth to the tenth rings inclusive. True legs six, articulated, brown; prolegs wanting, or replaced by double rows of hooks in pairs beneath the sixth, seventh, eighth and ninth rings, and two single rows under the last rings. Spiracles brown. A few very short hairs on each ring, arising singly from little hard points or pit-like, warty substances. Length from one inch to one inch and a fourth.

Aug. 17, one of these formed its cocoon of fragments of squash-stalks tied together with a few silken threads.

A few females, among many specimens of both sexes, are to be found having the abdomen brownish black above, thus corresponding more nearly to Hübner's *satyriniformis*; therefore Hübner may have had this variety before him, when he wrote his description.

Alypia octomaculata Fabr.

Found the larvæ very small and also nearly full grown on a grape vine some time in June, but the exact date not noted. One grown and two small ones were put into spirit. The others were fed in a pot half full of earth, in which some of them made their cocoons of earth, lined with a little gummy matter, as is the case in those of *Ægeria.* One specimen was winged the same summer, August 10th, 1853; probably the pupa state had continued about one month. One specimen remained a chrysalis all winter, and was winged May 25, 1854, in the house.

June 20, 1854; young larvæ, about one fourth to one third of an inch long. They let themselves fall by a thread when disturbed. They feed beneath the leaves, eating them like canker-worms. In confinement they eat the leaves entirely. If touched they will sometimes raise the tail and vibrate it laterally and quickly.

July 2, 1854. Larvæ of various sizes. Very young specimens, not more than three tenths of an inch long, were destitute of the black transverse lines found in older specimens; they were whitish, tinged with dull orange red on the middle of each segment, and with numerous, irregular, brownish, transverse lines between. The dorsal series of tubercles, particularly on the fourth, fifth, sixth and eleventh segments were very prominent, acuminated and brownish black. The others were brown as were also the feet. The head and top of the first and last rings were very pale red, and the dots were obsolete or invisible upon these parts. The side of the eleventh segment was distinctly marked with a white, irregularly shaped spot. The hairs on the tubercles were distinct, but colorless. As the larvæ become older and larger, their colors become more intense and with stronger contrasts. The pale orange bands become deep orange; the transverse, brownish lines and the tubercles become deep black; the head, etc. become darker colored, and the black dots upon it are visible to the naked eye.

Some came to their full size, and went into the earth July 3d, 1854. Fully grown specimens found as late as July 16th, 1854.

July 2, 1854. Found one little one not more than one fourth to one third of an inch long. Like all the others, the hairs and the white spot on the side of the eleventh segment, and the dorsal tubercles, were very distinct.

July 16, 1854. Full grown larva. Length, when at rest, one inch and two tenths, very pale blue, transversely banded with orange on the middle of each segment, the bands dotted with small black points, producing hairs, and surmounted by black lines, and between each of the bands six transverse, black lines. A large, irregular, white spot on side of the tenth and eleventh segments, and a series of smaller white spots on each of the other segments except the first three. Head orange dotted with black. Legs blackish externally. The young larvæ are whitish. The full grown have a decided bluish tinge, entirely owing, however, to an optical phenomenon from the contrast of the white with the transverse black lines. The head is of a pale dirty orange or rusty yellow, with about eight black dots on each side; a semicircular plate on top of the first segment and the anal valves are pale orange dotted with black. There is a transverse series of black dots on the second and third segments, without any orange band. Each of the other segments is transversely banded with orange and dotted with black, the dots being in two alternate rows, and all of them emitting distinct, long, whitish hairs. Between each of the bands there are six slender, continuous, black, transverse lines. The points are also connected by interrupted black lines. Legs at base orange, black externally and at tip, except the anal pair which are orange, dotted with black. The large, white, lateral spot is common to the side of the tenth and eleventh segments. The other lateral white spots are situated immediately behind the bands on the fourth, fifth, sixth, seventh, eighth and ninth segments, the anterior spots being largest; and thence they diminish to the ninth, while again the posterior spot is very large and very distinct. The orange bands are interrupted on the top of the seventh, eighth and ninth segments.

Cocoons examined in August, 1855, made the same year in the ground, had not a particle of silk, and no appearance even of gum; they were mere earthy cases, which crumbled on being handled, the mouth only being flattish and appearing to have been made of earth plastered by the insect.

Arctia Arge Drury

Oct. 23, 1840. Found one larva under a stone, another running across the road. Black above and below, with three longitudinal, flesh white stripes on the back. Tubercles gray with radiating black hairs. On each ring, above, four tubercles, two and two, the anterior pair smallest; below the lateral line three tubercles. Hairs beneath rusty. Prolegs rusty yellow. Fore legs black. Head black. A flesh colored spot on the side of each ring. The upper side of the body greenish gray; tubercles same color, but surrounded by a large black spot, which gives a general black color to the whole body. The white spots are between the two upper rows of lateral tubercles.

Arctia americana Harr.? or **scribonia** Stoll?

From Prof. Agassiz's collection. Oct. 9, 1848.

Body black, with silvery white spiracles and short, close shaved hairs, which are gray on the back, and rust brown on the sides. Hairs on the first three segments entirely rust brown, with which are intermingled some longer hairs overhanging the head. Intersections opaque and black, like rest of body.

Larva black, with silvery white, conspicuous spiracles. Head shining black, immaculate. Legs and prolegs black. Body with minute, setiferous, dusky tubercles regularly arranged, but not visible on account of the hairs which arise from them in tufts. The tufted hairs short and even, as if sheared. They form a broad gray stripe, from the top of the fourth segment to the end of the body. The tufts at the sides, and on the first three segments, are rust brown. Intermingled with the sheared hairs on the first and second and last segments are a few long hairs, overhanging each extremity. Rolls into a ball.

Arctia virginica Fabr.

Larva, found common on the plantain, July 15–25, 1828. Body cylindrical, tuberculated, above straw colored with a lateral black line connected with transverse dorsal ones dividing the segments. Tubercles straw colored with black points and bundles of divaricating, pale straw colored hairs intermingled with a few black ones. Tubercles twelve on each segment, four dorsal, and four lateral on each side, the lowest three approximated and situated beneath the stigma, which last is also beneath the lateral black lines, and just above the lateral fold. This fold is of a pale sulphureous color. Body beneath and intermediate prolegs black. Head, feet, anal prolegs and tips of the others pale ochreous. The tubercles are not situated in one transverse line, but of the dorsal ones the two upper are in front of the others; the upper lateral tubercle is above and in front of the spiracle, and the three under ones beneath and behind it. The hairs are of moderate length, and all barbed. Some larvæ of a dark rust color, with chestnut colored hairs, also produced the same perfect insect. ♀ ?

Cocoon. Of silk interwoven with hairs. All the hairs are not used, so that the larva appears to be clothed with a few short ones.

Pupa. Chestnut brown, darker behind. Three dilated furrows surround the middle of the posterior half. Tail blunt conic, terminated by a number of straight adminicula, abruptly ending in a hook at their apices.

Imago. July 26th to Aug. 5th.

Euchætes Egle Drury. [Pl. II, fig. 5.]

Inhabits *Asclepias syriaca.* Gregarious, feeding in parallel lines or files on the under side of the leaves, eating the leaves from the edges, Aug. 20.

Body black, with a whitish lateral line, second and third segments each with four black pencils curving over the head; fourth with two black pencils and two shorter white ones on the back, and a horizontal, long, white pencil on each side; fifth to ninth segments each with a dark orange and a pale yellow, incurved tuft on each side of the back, and a lateral, horizontal, black pencil; tenth segment with a dark orange and a white, incurved tuft on each side of the back, and a horizontal, white pencil on the side of the body; eleventh segment with two black, connivent pencils, and two incurved, white tufts on the back, and a lateral, horizontal black pencil; twelfth segment with two incurved, black tufts. The tufts and pencils all proceed from small tubercles; the dorsal pencils and incurved tufts conceal a series of deep black, much shorter tufts, and the lateral pencils and tufts are surrounded by little whitish hairs diverging in a stellated manner, and the sides of the body below the horizontal pencils are also covered with these little stellated tufts of whitish hairs. Head black, with the lip and base of the antennæ white. Legs black.

Larva. Found on *Asclepias syriaca.* Gregarious, particolored. Head and body black, with a narrow, white, lateral line and sixteen legs. Head incurved, and first four segments arched upwards, in repose. Each segment with a transverse series of short, stellated tufts of whitish hairs; second and third segments each with four black pencils curving over the head, and nearly horizontal in repose; fourth segment with a short, dorsal tuft of black hairs, covered on each side by an erect, conniving pencil of black hairs before, and a shorter, incurved, white tuft behind; a horizontal white pencil on each side above the white lateral line; fifth to ninth segments, inclusive, each with a dorsal black tuft, covered at the sides before by a dark orange, and behind by a lighter orange, or pale yellow, incurved, longer tuft; on each side above the white lateral line a horizontal black pencil; tenth segment with a central black tuft, covered before by a deep orange, incurved tuft, and behind by a snow white one, also incurved or connivent, and on each side, instead of the black horizontal pencil, a longer white pencil. Eleventh segment with a dorsal black tuft covered, as on the fourth, with two erect, connivent (but not incurved), black pencils before and shorter, white, incurved ones behind; lateral pencil black. Twelfth or anal segment with a dorsal jet black tuft, covered on each side by a longer, incurved, black pencil ; no lateral pencils.

The short dorsal tufts are jet black. The pencils are of a black color, not nearly so intense.

Lophocampa caryæ Harr.

Caterpillar found on the nut tree (*Carya porcina*), Oct. 1, 1827. Body above white, beneath cinereous, head and corneous feet polished black; fourth to eleventh dorsal segments, with transverse series of fan-shaped tufts of black and white hairs, the central being black (so that the insect appears to have eight black spots in a series on the back); sides and anterior and posterior segments tuberculate, and with white fascicles; fourth segment with two elongated black tufts or pencils, eleventh [1] with four pencils of black hairs. Rolls up when touched. Cocoon simply formed of hairs. Shape oblong oval. Moth came out June 1, 1828.

Aug. 28, 1838. On fences, fully grown. Body satin white above, dusky beneath, head and true feet black, prolegs dusky; sides of the body spotted with black, and with black tubercles emitting stellated or divaricating, white hairs, the two dorsal series short, truncated, and converging, and of a black color from the fourth to the eleventh segments inclusive; two black pencils on the fourth and tenth segments and a dorsal series of black spots from the fourth to the eleventh segments ; on all these segments the dorsal tubercles are in a double series, viz., two before, nearer together than the others—one half of the hairs from which are black, and converge in a tuft on the back, and the other hairs are white ; two others more distant, and furnishing only divaricating, white hairs. These four dorsal tubercles are transverse, or very elongated (almost linear) oval; the tubercles on the sides are hemispherical. The white hairs on the first three segments, and on the two last, are longer than the rest; and those on the sides of the body are longer than those on the back. The black pencils on the fourth and tenth (not eleventh) segments, are longest of all. Rolls up when touched.

Sept. 18, 1840. Larva white, covered with white hairs in short spreading tufts, a row of eight black tufts on the back, beginning on the fourth segment; two long, black, pencil-like tufts on the fourth and tenth segments; four white pencils on the second and third, and two on the eleventh and twelfth segments. Head and prolegs black; the surface of the body with minute black tubercles, and a transverse black line between each segment. It varies in having the tufts of hairs each side of the dorsal black series dusky.

July 15, 1842. On the last leaf of a branch of *Tilia americana*, found a swarm of these caterpillars just hatched. The eggs were laid on the under side of the leaf, forming a broad patch an inch in diameter. On the 23d examined the swarm again; the caterpillars were a quarter of an inch long. The little black dorsal tufts very visible, though small; the other hairs thin, and permitting the skin and tubercles to be easily seen. The insects were all together, as thick as possible, side by side on the lower surface of a leaf. They had eaten all the parenchyma of the terminal leaves of the twig, leaving only the veins and intervening reticulations. They had spun a few threads, forming a very slight and hardly conspicuous web on the leaves and twig, probably in moving about, and not for a shelter. When first found these caterpillars were mistaken for *Hyphantria textor*, a circumstance which tends to show that these species should stand near each other in a natural arrangement.

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[1] This is probably a mistake for tenth segment.

Lophocampa maculata Harr. [Pl. III, fig. 9.]

Larva found on the black walnut, Aug. 15, 1828. Feeds also on the ash and oak, on which I found them Sept. 25, 1840. On ash, Sept. 10, 1840.

Body blackish, or greenish black above, pale or whitish beneath. Head deep, shining black, lip and base of palpi white; feet and prolegs pale ferruginous or luteous. Each segment has twelve tubercles arranged alternately in two transverse series, which furnish radiated bunches of barbed hairs, which are dirty yellow or brownish when the caterpillar is half grown, but which, after the last moult, become cinereous; the dorsal series converge, and are brownish at tips, and truncate. Second segment with two large and distinct, and four smaller, indistinct, white plumes, and two black ones extending over the head; third segment with a lateral white, and two dorsal black plumes; eleventh segment with two dorsal black plumes. Length when fully grown, one and a half inches.

Hair on the twelfth segment longer than the others. The caterpillar depresses its head, and hunches the four or five hind segments when at rest.

Cocoon Aug. 15, 1828. Oblong oval, composed of hairs from the body, connected by a few silky fibres. The perfect insect was not obtained.

Lophocampa tessellaris Sm.-Abb.

Sept. 4, 1835. On the buttonwood. Body pale yellow, with dusky tubercles, giving origin to truncated fascicles of divaricating hairs of a pale yellow color; the dorsal series erect and darker; the lateral ones spreading. On the second segment two long pencils of ferruginous or tawny hairs, beneath which on the first segment are four shorter pencils of white hairs; third segment with two long, ferruginous pencils, and two shorter, white ones at the sides; antepenultimate segment with two long, white pencils; head clear tawny; body beneath naked, bluish white, with a tinge of yellow; a large fuscous spot above each of the feet, and a similar one in the same situation on the intermediate segments, feet all pale yellow. Abbot's figure does not agree with our caterpillar, but the moth is the same.

Aug. 20, 1828. Larva found on the buttonwood. Length over one inch and a quarter. Similar to the preceding in form, tufts, etc., but differing in colors. Body white above and beneath. Twelve black tubercles, transversely oval, placed in each segment in two series as in the figure. From the tubercles diverge radiated tufts of yellowish white, barbed hairs; the tufts of the four superior tubercles coalescing and truncate above. Second segment with six white and two ferruginous plumes, namely, two dorsal, white ones, on each side of which is a ferruginous pencil, and below this two white ones; third segment with two white and two ferruginous plumes, viz., two dorsal ferruginous, and one white below these on each side; eleventh segment with two white plumes. Head pale ochreous, or ferruginous; lip and base of palpi white. Feet and prolegs pale, or dirty white. Rolls up when handled.

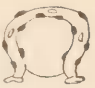

Fig. 39.

Cocoon Aug. 12, 1828. Oblong oval, composed of the hairs interwoven with a very little silk. Perfect insect came out June 18, 1829.

Orgyia leucostigma Sm.-Abb.

Larva found on the willow, rose bush, *Celtis* and *Carya*, Aug. 30, 1821. Another was seen on a rose bush, July 31, 1821, its cocoon was formed and it became a chrysalis, August 3, 1821; the perfect insect came out, August 12, 1821.

Cocoon double, very thin, interwoven with few hairs, July 19, 1828. Imago July, Aug. and Sept., 1828. Female apterous. Eggs deposited upon the cocoon in August.

Orgyia sp.

Probably the same as the above. Found on plum trees, Sept. 25, 1841; some very large (females), others moderate in size. Slate gray; a broad black dorsal stripe, a bright yellow line on each side of the black stripe, beginning on the eighth ring and continued to the tail, and a narrower, interrupted, yellow line on each side of the whole body, bordered above with black just below the spiracles; three yellow tubercles emitting spreading clusters of yellow hairs on each side of the rings, four smaller tubercles in a transverse row with yellow hairs on the top of the second and third rings, two on the top of the eighth, ninth, and tenth rings; on the two latter a coral red wart; on the eleventh ring a large pencil of brownish black hairs the longest of which are dilated at the end; top of the first ring carmine red with a pencil of blackish hairs of unequal length, and dilated at the tips, on each side. Head blood red, with the triangular piece and the sides black. Feet and middle of the body beneath yellow. Intermingled with the yellow tufts are a few long, simple, black hairs. On the top of the fourth, fifth, sixth and seventh rings there is a short thick tuft of white (sometimes pale yellow) hairs.

Clisiocampa sylvatica Harr.

June 3d, 1826. Found the larvæ on the apple tree. Head and feet blue. Body with thinly scattered, yellowish hairs. First segment blue above, with a yellow spot and black dot on each side of the spot; eleven next blue with a dorsal white spot; dorsum, on each side, with a reddish brown stripe margined with black, and on the top varied with three smaller red lines, margined with black; each white spot divides, at the hinder part, a transverse black line; side with a broad blue line, margined with black; below this a narrow yellow line, margined with black; remaining half (lower) of the side greenish blue; beneath blue black; spiracles black.

One cast its skin June 13th, and came out an imago July 1st, 1821. The moths appeared about the last of June, 1820.

Gastropacha americana Harr.

Sept. 18th, 1830. Found larva on trunk of the apple tree. Has sixteen feet. Length two inches and a half, and the transverse and vertical diameter are almost equal; body convex above, flat beneath. Hairy, but the hairs disposed so that the colors of the body can be distinctly seen. Body above ashen gray variegated with large, irregular, whitish spots, and finely punctured above with black. A large, more conspicuous, triangular spot on the sides of the fourth segment,—the apex of triangle directed backwards. A similar, fainter one on sides of sixth segment; both white. On the posterior margin of the second and third segments is a transverse band of a beautiful scarlet color with a black spot at each end and a smaller dot in the middle. These transverse bands are not seen except when the insect is in motion or stretches forward its anterior extremity. The under side of the body is of a fine yellow color, with a black, lozenge shaped spot between each of the membranous feet; a much larger spot including the fore feet, in each of the first three segments, and a small one beneath the segments destitute of feet. The true feet are jet black, and the spurious ashen colored with a black spot near the body. The head is ashen, with a depression on the front, and five small black eyes each side. On the first segment are two conical tubercles at each side, the lower pair being much the longest, and projecting anteriorly. Each subsequent segment has one tubercle on each side much smaller, and progressively so to the last. Each tubercle is ornamented with a tuft of hairs, also progressively shorter, the hairs being gray, and amongst them are shorter hairs tipped with a white knob, flattened and nearly oval. The sides of the body, or rather the lateral edges, are fringed with many of these shorter, clubbed hairs, which lie flat on the plane of position. On the penultimate segment is a dorsal, short, conical tubercle, destitute of hairs, as is the greater part of the upper surface. Upon the edges of the under side, particularly in the wrinkles, are numerous short hairs, like scales, which lie very thick together and are of a yellow, satiny lustre.

Gastropacha velleda Stoll.

Aug. 24, 1841. Found on cherry tree. Length when at rest one inch and three fourths, in motion two inches. Gray above (in consequence of the fine, close, blackish dots with which the surface is covered), and with slender, wrinkled, longitudinal, white lines. A whitish band across the fourth ring, immediately behind a concealed, velvet, black band on the top of the third ring; and a whitish spot on the eighth and on the tenth rings. Sides of each segment with a long horizontal tubercle just above the legs; the tubercles furnishing spreading tufts of horizontal black hairs, intermingled with a few white ones which end with a little flattened knob; the hairs forming a fringe on each side of the body. First segment with a shorter tubercle just above the long one on each side. Each of the following rings with two dorsal warts, those on the top of the third ring, before the transverse opening, very prominent, and of a dark rust color. Body beneath naked, orange colored, with a black spot in the middle of each ring. First six legs pale rust colored, the others ashen.

N. B. The prominent single tubercle found on the top of the eleventh ring in some other lappet caterpillars is wanting in the above, there being only two small warts, as on the other rings.

Cocoon in a box August 3d, 1841. Winged Oct., 1841.

Attacus luna Linn. [Pl. IV, fig. 14.]

Found the larva on *Carya porcina* July 25; also on *Juglans cinerea*.

Body thick, segments distinct or strangulated. Head blue green, mandibles brownish, lip dirty yellow, ocellar area pale brown, palpi pale brown, their basal tubercle yellow. Body pale bluish green, skin thinly covered with very short, yellowish bristles. First segment pale, anterior edge straw colored, lateral tubercles four, pale purple white at tips; dorsal tubercles obsolete, replaced by a black hair. Second to ninth segments inclusive, each with two dorsal and four lateral tubercles (of the latter, one is above, and the other below the stigma of each side). Second to fifth segments with one more tubercle on each side of the belly. Eleventh segment with only one dorsal tubercle and two lateral ones on each side; anterior portion of the twelfth segment with two dorsal tubercles, and on each side one lateral one. Posterior margins of the fourth to tenth segments inclusive, with a demizone of a straw color, which is connected with a lateral line of the same color, just above the lateral fold. Tail with a transverse, lunate, castaneous spot, margined in front with straw color; base of the anal prolegs each with a similar spot and margin. Feet pale castaneous; prolegs green, with two transverse series of black hairs. The tubercles all furnish black hairs, longer than those which issue from the skin. Length over two inches. Attitude of this larva when at rest similar to that of the *Sphingidæ*.

Attacus Polyphemus Linn. [Pl. iv, fig. 17.]

Found on *Tilia americana*, *Ulmus* and other plants.

Sept. 15, 1823. Found on a rose bush a larva of a green color, with a double row of very small setiferous, orange colored tubercles on each side, between which rows were whitish diagonal lines. It formed its cocoon Sept. 17, 1823. Another found in the pupa state in its cocoon in the autumn of 1822, became a perfect insect between the 15th and 30th of June, 1823. Found the moths in coitu June 20, 1821.

Attacus Cecropia Linn.

Larva fully grown. Head and body pea green; lip tinged with pale blue; feet yellowish green tipped with a few hairs and a black claw. On top of first segment four blue spots, approximated on each side in pairs; two elongated, blue tubercles on each side, armed with two black hairs (the spots not hairy). One stigma on each side of this segment pale blue, edged with a fine black line. Second and third segments having each on the top two light red, spherical tubercles, with a spine on the summit and six spines around it, of a black color, and pointing upwards, with seven or eight obtuse spines surrounding the base; below these tubercles, at the sides, one lesser tubercle, more elongated, of a light blue color, darker at base, and armed with six black spines surrounding a central one; lower down, on each side, two smaller, elongated, blue tubercles, armed with two or three black spines. Fourth segment crowned with two light yellow, spherical tubercles, which are surmounted with about six black spines, and surrounded at base with six black spots. At the sides three small, elongated, pale blue tubercles, darker at the base; the upper one with four spines, the next with about three, and the lowest minute with a single hair; a spiracle between the upper two of these tubercles. Fifth segment with two yellow, elongated tubercles, having about five black spines; three lateral, blue tubercles with one or two spines; a spiracle on each side also. Sixth, seventh, eighth and ninth segments, containing a pair of false feet of a yellow color, with light blue soles or cushions; and on each of these segments two yellow, cylindrical tubercles, armed with two black spines; a spiracle between two blue tubercles, which are armed with three or four black spinose hairs. Tenth segment like the others, except that it has no feet. Eleventh with one nearly spherical or ovoid, yellow tubercle on the top, with eight black spines upon it; a spiracle each side between two blue, spinose tubercles. Twelfth segment with four blue, spinose tubercles, paler at the summit, and deeper blue at base; nearer the tail two small, terminal, blue tubercles with a few short spines on them. Cushions of the last pair of feet at the tail, blue.

Some of these larva were found on the wild cherry tree, Aug. 3, 1825. These caterpillars often fail of producing moths in consequence of being destroyed in the pupa state by parasitic or intestine enemies. I once found eighteen larvæ of some parasite (apparently the same that infests the grape vine sphinges) in the posterior half of the larva of *B. Cecropia*, which had spun its cocoon, but had not strength to transform to a pupa, and the cocoon had only its external thick coat. In these cocoons are sometimes found the cocoons of an Ichneumon, which devours the larva of the *Bombyx* and obliterates all traces of it, leaving in its stead a firm ovate cocoon for itself. This, when the Ichneumon comes out, is opened at the top by a little lid becoming detached, as in many flies.

Saturnia Io Fabr.

Lives on the Balm of Gilead tree; the caterpillar also eats clover and elm leaves. When young gregarious, feeding and moving like the processionary caterpillars, in files. Larva green, spinous, spines poisonous. Measures two and a half inches. In transforming, enclosed itself in a case of leaves lined thinly with silk.

Larva seen.	*Moulted.*	*Spun cocoon.*	*Imago.*
July 17.	July 27, Aug. 3, 11, 23.	Sept. 10.	June 20.
		Aug. 13.	June 22 ♀.
		(2) " 18.	" 23 ♂.
		(2) " 19.	(2) " 25 ♀.
		Sept. 1.	July 6.
		" 10.	" 16.

July 7, 1849. Just hatched, or only a few days old, on *Robinia viscosa*, in a cluster beneath one of the leaves; yellowish rust color, with black, branched spines. Head pale brown, polished. Saw them walking in file when a week old. About July 10 they moulted, ate up their cast skins, and appeared of a paler, reddish brown color, with black spines. July 22, moulted again, ate their skins, and then were of a greenish color, with a brown lateral line and green spines tipped with black. Moulted again July 29 and 30. Color still brighter pea green. Some of the specimens moulted again between August 5 and 12, have come nearly to their full size, and have their color completely developed.

Very pale blue green above, darker green below the lateral line, which begins on the fourth and ends on the eleventh segment, and is red brown above and white below, with a faint edging of brown below the white, particularly across the intersections. There is also on the same segments a lunated spot above and before the prolegs, and on the corresponding parts of the apodous segments, of a red brown color, spotted with greenish yellow. The spiracles are white and are on the brown part of the lateral lines. Legs, prolegs, and side valves of the podex, brown, spotted with pale greenish yellow, the brown color of the valves coalescing with the lateral line anteriorly. Head pale blue green, globular, with brown lip and mandibles, and jet black ocelli. Each segment, with one transverse row of tubercles, surmounted by a many branched set of spines. The tubercles and spines green, rather darker than the skin of the body, and black tipped. The longest branches end abruptly with a more slender, elongated, blackish bristle, the shorter ones with merely a black, attenuated point. Each fascicle has from twenty-four to thirty branches, spreading from a common centre, in all directions; there are four of these fascicles above the lateral line on the back on every segment, except the eleventh, which has only three, and the twelfth, which has five, — four in one row and one behind them. On the segments bearing the prolegs, and on the eleventh and twelfth there is, on each side, one fascicle below the lateral line, and on the other segments there are two fascicles below the dorsal series. My description in the Treatise is herein corrected. Several had made their cocoons by Aug. 20, and all by Aug. 27.

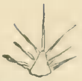
Fig. 40.

Each dorsal fascicle of spines consists of about thirty, which are green, tipped with a sharp black point, springing from a common centre. In each segment, except the last two, are four fascicles above the lateral line; on the penultimate are only three, the central one the largest; and on the last are five, four in a lateral series, and one central behind. Below the lateral line is a small fascicle in each segment, and an additional one still lower in the first four and antepenultimate segments. The fascicles on the first segment are furnished with a central branch, which is black and blunt at the extremity, and surrounded by branchlets of the same color, blunt, but furnished with a black bristle at the end.

Colors. Head pea green; lip white; mandibles ferruginous at base, black at apex; palpi and antennules whitish with black tips; region of eyes lunated anteriorly, black; eyes, six on each side, arranged as in Fig. 38; lenses glassy-white, or diaphanous. Triangular front in the young caterpillars margined each side with black, with two black dots below; in old ones faintly margined at side only, with brown. Body pea green, lateral line beginning with the fourth segment; the upper two thirds (containing white spiracles) broad, rich ferruginous brown, deeper above, lower third white, slightly variegated below with streaks of pale brown; the brown line extends into the posterior feet. Before the origin of the spurious feet a triangular spot, and the base of triangle anteriorly, pale brown spotted with white; in the fourth and fifth segments the same spot but smaller; and on tenth, eleventh, and twelfth segments the spot is very large and contiguous from segment to segment. Anterior feet hairy, pale brown; articulations yellow. Posterior or spurious ones darker brown, with white hairs. Inferior surface of body slightly hairy.

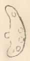

Fig. 41.

Ceratocampa regalis Fabr.

July 20, 1828. Found on the black walnut tree a larva like that here sketched, and on the 4th, or 5th of August, 1832, discovered two large flattened eggs, from which similar larvæ were hatched at that time.

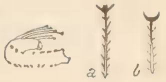

Fig. 42.

Each of the segments has six branching spines, except the eleventh, which has seven, and the twelfth which has eleven. Body, first segment with four tubercles of a pyramidal shape, the two dorsal ones armed with a barbed spine, terminated by a ball with two lateral obtuse points,—see Fig. 42, *a*; the two lateral tubercles with simple barbed spines not half the length of the dorsal spines; second and third segments each with four barbed, ball-terminated spines; lateral simple ones wanting; remaining segments, except the last, with four barbed or branched spines; the penultimate segment has besides, in front of the four, a long dorsal one barbed, and ending in a lunated knob; last segment with nine in two series, five before and four behind, all branched; the dorsal one of the anterior series bifurcate at tip, or nearly lunated,—see Fig. 42, *b*. Color of body black above and beneath; an obsolete series of ferruginous lateral lines directed obliquely downwards towards the tail, most conspicuous on the posterior half of the body; sixth and seventh segments ferruginous above; spines pale ferruginous, black at tip.

July 21, A. M., it cast off its skin. July 25, cast its skin again.

Pupa. ♂. Smooth, oblong, robust, thick and rounded before, nearly obtuse behind, and terminating in a very small bifid tubercle. A few elevated points at the base of the antenna cases, and over the shoulder covers; likewise one on each half of the prothorax; metathorax with two large, transverse elevations. A deep furrow between the penultimate (eleventh) and antepenultimate segments, and an elevated ridge beset with minute teeth on the anterior part of the eleventh dorsal segment. Near the anterior edges of the other abdominal segments there is a row of very minute and nearly obsolete teeth pointing backwards. Color, dark chestnut brown. Length two inches, breadth nearly three fourths of an inch.

Dryocampa senatoria Sm.-Abb. [Pl. II, fig. 9; Pl. IV, fig. 12.]
Red and black striped caterpillar of the oak.

Larva seen.	*Pupa.*	*Imago.*
Aug. 31.	Sept. 8.	(2) July 1, ♀.
		" 14, ♂.

Aug. 6 (one third grown).
Eggs laid upon the under side of leaves.

Dryocampa stigma Fabr. [Pl. II, fig. 12.]
Found on an oak tree, Sept. 18, 1841.

Length and size of the figure. Dark wax yellow, shaded with red, and covered with white elevated dots; head deep ochre yellow, rounded and smooth; a narrow dorsal and a wider, lateral, dusky line; tubercular spines black, with elongated white points around them; spiracles black on a white ground. First ring with four elevated black dots; second with two elongated, filiform, obtuse and movable, black horns, and on each side three acuminated, black tubercles, one above, one on, and one below the lateral line. Remaining segments to the twelfth inclusive, with two dorsal, elongated spines, and on each side, one above and two below the spiracles. Thirteenth segment with one dorsal, two lateral, and two subventral spines before, and two small dorsal spines behind, on the sides of the anal triangle.

Went into the earth Sept. 24, 1841.

Dryocampa pellucida Sm.-Abb.
Sept. 25, 1827. Found on the oak a horned larva, similar to the common, gregarious, horned, black and yellow striped caterpillar of the oak. Body deep pea green, with longitudinal stripes of pale green, disposed like the yellow stripes in the one just named. Spines and horns black, and a transverse series of six black spots on the edge of the first segment or neck. Tenth and eleventh segments rosaceous at the sides, head ferruginous. Beneath pea green, margined with dark green.

Found two larvæ on the oak at Prospect Hill, Waltham, Aug. 8, 1849; both had been stung by Ichneumons, and I took off from them a considerable number of the oblong oval white eggs. Form similar to that of *D. senatoria.* Body thickly covered with minute pearly white granules; greenish white, with two dorsal, dull purplish red stripes above, and on each side one below the spiracles. On each segment, third to eleventh inclusive, six short, acuminated, black tubercles (two above, and two on each side); between the lateral ones are the black spiracles. The first segment has also six tubercles, but they are not acuminated. The second segment has the two dorsal tubercles elongated, forming a pair of filiform, slightly recurved, black horns. The twelfth has only five, the middle one shortest; but the anal clappet is beset with several of a yellowish color, of which two behind are most prominent.

Head dull greenish or brownish yellow; as also the anal clappet, legs and prolegs.

Oiketicus coniferarum Harr. MSS.

"Drop-worm," or "basket-worm," of the Pennsylvanians. Dr. Pickering told me it was very common on the trees in Philadelphia, hanging its pods covered with bits of sticks, etc., to the twigs. I suppose it to be an *Oiketicus*, and similar to the one received from Long Island, and mentioned in my work on injurious insects.

Miss Morris, in a letter dated Sept. 11, 1849, states that "the drop-worm is now feeding in this neighborhood, though not in our garden, and I promise you all I can procure in their different states. The female never leaves her case, and is wingless. She deposits her eggs in the case in the fall, where they remain sheltered all winter, and hatch when the leaves are sufficiently matured to feed them. The mother dies as soon as her eggs are deposited, and late in the fall, all winter, and in the spring, these cases are to be found in abundance, filled with eggs, or empty. Hence I infer that the male fly makes its appearance about this time, and a little later, and never in the spring, as I have never found a living pupa after October. Though these insects are abundant some years in this neighborhood, I have never been able to procure the male insect when I could be certain of its identity, as in every instance an ichneumon was found in its place."

In another letter from Miss Morris, dated Sept. 24, 1849, she says: "Had I known your wish to obtain them (the drop-worm) two weeks sooner, I could have sent any quantity; but when your letter reached me (Sept. 18?) they had finished feeding, and are now dangling at the tops of the trees in the streets in Philadelphia, far out of my reach. A few days since I stood under a tree in town covered with their pods, etc. The favorite food of this worm is the larch, arbor vitæ, hemlock, and trees of that order, and the maple and linden. From this marked difference in their food, I am inclined to believe there are two species, but cannot speak certainly. They weave their cases, as other case-moths do, and in like manner carry them with them, fastening them to a leaf while feeding, and dropping from branch to branch, by the aid of a thread of silk, when inclined to wander. I have one in a vial of spirit that was feeding, the only one I could procure, and four others that had closed their sacks for the season," etc. "The drop-worm pod, which I enclose, is empty. It is off a maple, and larger than the one last sent. My brother promises a box full from Maryland, where he resides. He says they have been on his cedar trees in profusion this summer."

Larva (in spirit), taken Sept. 20?, fusiform, broadest across the fifth ring, as seen on the back, but seen laterally the third and fourth rings are the thickest. Length fifteen sixteenths of an inch. Body, except the head and first three rings, livid, smooth, without hairs. Head moderate, hemispherical, white, spotted with black, one row of six spots in form of an angle in front, and behind them on each side three linear spots, with others of an irregular shape near them. Five eyelets in a circle, immediately behind each of the palpi. First segment corneous above, white, regularly ornamented with black spots, second and third segments shorter and much wider. The second with a transverse, corneous, white plate above, marked with four large, longitudinal, black spots, and two black dots; third segment with transverse, oval, corneous plates, particolored black and white. Legs very large, all directed forwards and claw-like, having the coxæ of each pair very large, lamellate, and coalescing by a suture. The third pair of legs the largest, the others progressively smaller, all ending with a single stout claw. Coxæ particolored black and white. Legs castaneous, except the last joint, which is piceous red. Intermediate prolegs not prominent, but visible by their transverse oval coronets of hooks. Spiracles eighteen, in the usual order. Anal clappet perpendicular. The larvæ are found in their cases with the head towards the top, the case having a cylindrical hole above as well as below, but the upper one closes naturally by the weight of the case when hanging. All the dead larvæ were found head uppermost, and never towards the lower orifice.

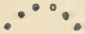

Fig. 43.

Pupa of the male head downwards, and half exserted when the insect is ready to disclose the moth.

Put a quantity of the pods on the arbor vitæ in May. Found the larvæ and their pods, the latter three eighths of an inch long, on the arbor vitæ and adjacent apple trees, July 20, 1850.

Limacodes scapha Harr. [Pl. III, fig. 8.]

In Sept. and Oct. 1827, I found on the apple tree some small larvæ, similar in form and color to the one figured, which came from the black walnut tree. They were deep green above, the lateral angles and margins reddish; pale green beneath; feet (if any) retractile. Cocoon dense, almost parchment-like.

Limacodes ephippiatus Harr. MSS. [Pl. I, fig. 7; Pl. II, fig. 10.]

Received from the Rev. Thomas Hill; probably from Pennsylvania. Eats grape vine and rose leaves, and *Ribes aureum.* Pea green above, head and first four segments, an oval spot on the top of the back on the sixth and seventh segments, and another larger oval spot on the tenth and eleventh segments, purple brown. The green portion edged before, behind and below with white. The brown, oval, dorsal spot encircled with a white border. A small white spot on the top of the fourth segment between the tubercles, a smaller, round, white spot on the top of the tenth segment between the tubercles; a large one each side of the dorsum of the eleventh segment, two deep purplish red, velvet-like spots on the tail, and one similar one each side of the twelfth segment, on the lateral line. Abdomen beneath flesh colored. True legs six, very short ; prolegs none. Abdomen furrowed longitudinally beneath, having thus two longitudinal, contractile ridges, which serve in progression instead of prolegs. Head retractile, entirely within the hood-like projection of the first segment, second segment with four small, hemispherical, brownish tubercles, beset with short, whitish spines tipped with black, third segment with four similar, spiniferous, larger tubercles, of which the dorsal pair is the largest, fourth segment with two long, conical tubercles similarly armed with longer, stinging spines. Each side of the fifth, sixth, seventh, eighth, ninth, tenth and eleventh segments with a spherical, spiniferous tubercle on the white lateral line above the spiracle; top of the tenth segment with two long, conical, spiniferous, stinging tubercles, similar to those on the fourth segment. Tail with four spherical, spiniferous tubercles, two above and two below on the lower edge, smaller than the upper pair. The tubercular spines of this very singular larva sting like those of *Saturnia Io.* The entire and absolute want of prolegs is another anomaly in this insect. It is known in Pennsylvania by the name of the devil's saddle-horse.

One of these caterpillars languished, and on the 9th of Sept. was put into spirit. One lived till Sept. 20, when a host of Ichneumons issued from its body, and made their silken cocoons on the outside. It was then put into spirit. The moth belongs to the genus *Streblota* Hübn.

[**Seirodonta bilineata** Gr. and Rob.] [Pl. I, fig. 5.]

Probably a variety of the following. Inhabits elm. Sept. and Oct., 1837. On fences August 28, 1838, Sept. 9, 1841.

Body green like the following, with a lateral white line approximating on the fourth, third, second and first segments and distant on the others; dorsal line and tubercles as in the following. On the sides of the sixth and ninth segments a triangular, claret red spot. This caterpillar varies in having also a semicircular red spot on the top of the fourth segment; and sometimes the entire back between the white lateral lines is claret red, and angulated downwards on the sixth and ninth segments.

A young specimen, found Sept. 10, 1841, had the whole back deep claret red, bounded on each side by an irregular whitish line. The claret color was angularly dilated on the sixth and ninth segments, and the tubercles on the fourth and eleventh segments were also deep claret red. Length three fourths of an inch.

Sept. 10, 1842. Found on ground under button wood tree. Fed it with leaves of button wood; figured Sept. 14. [Pl. I, fig. 5.] Green, with a broad salmon colored stripe on the back, edged and variegated with deep red. Head reddish with a divaricating darker stripe each side. Legs green, anal prolegs reddish, tipped with black. A few scattered purplish dots on sides of body. Spiracles black, above which are the remains of an irregular, broken, yellowish, lateral line. It rests beneath a leaf, the head and fore part of the body being curled sidewise. It touches the anal prolegs in creeping, but does not seem to have any clinging power; they are raised (as in the figure) when at rest.

Sept. 16. Secured itself in a leaf, doubled and fastened with bands of silk.

Notodonta (Gluphisia?) ulmi Harr. MSS. [Pl. II, figs. 2–3.]

Inhabits the American elm. Sept. and Oct., 1837. On a fence, August 28, 1838. On fences near elm trees, Sept. 9, 1841.

Green, back paler. Head with a white lateral stripe edged before with vermilion and black; a reversed black V on the front; sides of body with minute black points and very short longitudinal lines. A white lateral line converging on the fourth segment before and diverging behind, and extending on each side to the tip of the twelfth segment; on the fourth segment, between two orange colored tubercles, begins a white dorsal line, edged with green, which also extends to the tip of the twelfth segment. The lateral lines on the first three segments are edged within or above with pink or purple, and sometimes a narrow purple edge borders the lateral line above to the end. On the eleventh segment two very minute orange tubercles, and a few very small yellow ones on the sides of the body. A yellow lateral line just above the feet on the first three or four segments. Spiracles orange. The minute tubercles on the fourth and eleventh segments emit each a black hair, and the other tubercles small whitish hairs. Twelfth segment with the prolegs elevated when the insect is at rest.

Notodonta unicornis Sm.-Abb. [Pl. II, fig. 8.]

Found the larvæ on a plum tree. Three straw colored spots on the penultimate ring, near the belly. The larva has a considerable resemblance to that of *Bombyx Milhauseri* Fabr., Ernst., 202, fig. 269, which I presume belongs to the genus *Stauropus*.

Larvæ found Sept. 29 and June 25. Cocoon found Sept. 29, and early in July. Imago, July 31.

Notodonta concinna Sm.-Abb. [Pl. I, fig. 3.]

Caterpillar on the cherry tree, Aug. 21–30, 1821.

Greenish yellow; head and dorsal hump on the fourth ring coral red, a double row of obtuse black spines on the back, and five black points on the sides of each ring, namely, two above and three below the spiracles; back with five narrow black lines; sides above the spiracles from the fifth to the tenth ring inclusive, white with black lines, first three rings spotted with black and white, last (eleventh) spotted with black. Legs black; prolegs black and yellow. Winged June? 1822.

Gregarious caterpillar in the autumn on cherry, plum, apple and rose trees. Spinous; abdomen bimucronate behind, or with this part elevated, the terminal pair of legs being the forked projections. It is striped with yellow, white, and dark brown or black; has a red head, and a fleshy red tubercle on the fourth segment. The body above is armed with a double row of twenty-eight black spines, longest on the tubercles, and shorter towards the extremities. It has also other smaller spines at the sides of the body, one in each segment. Feet sixteen, the first three pair with nails, the others without; the last pair at the extremity, which is elevated at an angle of forty-five degrees when the insect is not crawling.

This caterpillar feeds promiscuously on the leaves of all the trees above mentioned. They are less common, and of more rapid growth than the other gregarious caterpillars. New broods appear from the middle till the end of August. They enter the earth in the night, spin a very thin, silky web around themselves, and remain in the caterpillar state, though much contracted, for a long time afterwards. The moths do not appear till the next spring or summer.

Sept. 9, found that one caterpillar had rolled himself up the day before in a web covered with leaves. Sept. 10, others disappeared in the earth, and the remainder of those which I reared were gone into the earth on the 11th and 12th. July 1, a moth came out much mutilated.

Aug. 10, the larvæ observed on the trees. Aug. 15, one of them formed its cocoon on the surface of the earth, of leaves and silk.

Aug. 14, 1822, saw some small larvæ. Aug. 19, found the eggs of this insect on the under side of a leaf, and the caterpillars on the same branch about half grown.

Notodonta anguina Sm.-Abb. [Pl. I, fig. 12.]

Aug. 3, 1828. Found the larva on the *Podalyria tinctoria.* Its position when at rest like the gregarious caterpillars (*Pygæra*) of the apple tree, the head and tail being elevated. Anal prolegs long, filiform; a dorsal, interrupted, black line; two lateral and two abdominal, similar black lines. The black spots represented in the figure are very smooth and shining.

August 8, 1830. Found the larva on *Lespedeza capitata.* Aug. 9–10. It formed a cocoon of leaves and silk of thin loose texture. Aug. 13, became pupa. June, 1831, imago.

Sept. 1, 1849. Found on *Robinia pseudacacia.* It is blue white above, with four yellow stripes, a slender, black, dorsal, subinterrupted line, three similar, interrupted, black lines broken behind into spots on each side between the yellow stripes; beneath green, with a series of black lateral spots (one to each segment); head and six true legs light brick red, anal prolegs tipped with black, a black ocellate dot on top of the eleventh segment.

Notodonta albifrons Sm.-Abb.

On oak leaf. Oct. 7, 1848. Silvery white. Head round, ochre yellow. Legs and last joint of prolegs, pale ochre yellow. Tubercle on eleventh segment ochre yellow, polished. Two dorsal ochre yellow stripes, between which are five slender, black lines, interrupted at the deep sutures, and by the tubercles on the eleventh segment. A similar ochre yellow stripe on each side, bearing the spiracles, between which and the dorsal stripe are three black lines, and below which and the legs, are vestiges of three or four black lines, widely interrupted at sutures, etc. Of these stripes, only two are found on first segment. On the twelfth segment three short, interrupted, dorsal, black lines, on each side of which is a black dot, outside of which are the wide lines forming a $\overline{V}$, and behind all these a transverse row of black dots, seven in number •·•▪•·• Body beneath pale yellowish flesh color. When disturbed this caterpillar raises its head, and shakes the forepart of the body from one side to the other. Raises the tail rarely, and ordinarily only when perfectly still.

One found in September made a cocoon in a roll of paper. Abbot's figure is not correctly colored, the lower part of the body being too red, and the tail being colored yellow, while it should be white like the rest of body above.

Found on fence near horse-chestnut, Sept. 3, 1849. Not seen with head and tail elevated; smaller and shorter than *anguina*, but polished also. Pale purple red above, light red beneath. Three dorsal, black, continuous lines near together also; next to which, on the side of back, a pale red stripe; below the stripe three more black lines; below this another light red stripe (corresponding to the longer lateral yellow one of *anguina*), in which are the spiracles; below this, upon under side, a row of irregular black spots. Head and eleventh segments light red. No black ocellus on the top of the latter, but a hump.

This is doubtless the larva of the *albifrons* of Smith-Abbot. The transverse reddish hump on the eleventh segment suffices to distinguish this from the larva of *anguina*.

Notodonta? sp. [Pl. I, fig. 6.]

On a fence under sugar maple tree, Sept. 7, 1841. The figure is of the natural size, but not quite so much shortened as is the insect when at rest. Seventeen twentieths of an inch in length.

Legs sixteen. Body naked, very soft (like *Hypæna*), cylindrical, with a short, blunt tubercle directed forwards, and of a yellow color edged with red on the middle of the second ring. Color above and beneath pea green; head and feet bluish green. Head large, hemispherical, eyes black, very small; first ring wide before; last ring wide, hardly tapering, and with the feet distant, the latter being edged behind with yellow and red. Fourth and eighth and eleventh each with a semicircular, slightly elevated, crescent shaped ridge, slightly convex backwards, of a light yellow color, bounded before by a slender purple line, which is interrupted in the middle. There are about seventeen yellow warts in two transverse rows (eight and nine) on each of the rings, except the fourth, eighth and eleventh, on which the hinder row is replaced by the transverse, elevated, semicircular yellow line; these warts are not setiferous.

This caterpillar does not raise either end of its body when at rest, in which it differs from the *Notodontiadæ* generally. Possibly it belongs to some other group, perhaps to the *Herminiadæ*.

Heterocampa? sp.

Found Sept. 25, 1848. Green, minutely punctured with brown, and with numerous fine, longitudinal, wrinkled, whitish lines. A cream colored dorsal line on the first and second segments, dividing in two on the third segment, thus enclosing a lozenge shaped space on back of the fourth to seventh segments; on the eighth the white lines meet, and on the ninth they separate again, and run thence to each anal proleg, widening on the intermediate segments so as to form another elongated, diamond shaped spot. On the fifth and sixth segments the white lines are dilated on each side into a white blotch; and on the seventh segment, before they meet they enclose another white triangular blotch. The dorsal line is dilated on the first segment, and there tinged with red. The dilated spots on the fifth and sixth segments are bordered externally with a slender reddish line. Lateral fold marked as a white line. There is a reddish spot on the lateral fold on the side of the fourth segment, and a larger one on the side of the sixth segment. A little reddish dot at the origin of the hindmost of the true legs, and another at the origin of the hindmost abdominal proleg. The anal prolegs are tinged with brownish red on the inside, and they are long and very slender, and apparently without claws. There is a short, brownish, longitudinal line on the top of the anal segment. Head oval, pale brown, mottled with dark. Body green beneath. No tubercles or horns on the head, or on the first segment. Tail not raised in repose. The whitish lateral line is slender but very distinct, especially on the last two or three segments, being immediately below the spiracles.

Eudryas grata Fabr.

Larva on the grape vine in August and Sept., entirely naked, pale sky blue; the head, a transverse band on each segment, except the last, which has two, anal valve and all the feet orange colored; head, bands and feet spotted with black, and on each segment six narrow, transverse lines, two of which are contiguous to the band on each side. When at rest this caterpillar elevates the third and fourth segments very much, and depresses the head. There is an obtuse prominence or elevation of the anterior part of the eleventh segment, which is visible at all times. Eats the leaves of the grape vine, devouring the whole of the leaf from its tip and edges inwards, veins and all; commonly lives on the under side of the leaf. Found abundant Aug. 10, 1838.

These larvæ may be compared with those of *Cucullia*, which are banded with yellow, and dotted with black on the head as well as on the rings. See the figures of *C. Lychnitis* and others.

[The following is a MS. foot note appended to p. 330 of the second edition of Dr. Harris's Treatise on Insects Injurious to Vegetation.]

An allied species is figured in the first volume of Dr. Boisduval's Species des Lépidoptères, under the name of *Eudryas unio* of Hübner; but I do not know by whom the genus was founded. I had formerly called it *Cyphocampa*. As this report may possibly fall into the hands of European entomologists, it may be proper for me to make a few remarks explanatory of my reasons for still following my Catalogue of the Insects of Massachusetts, in placing *Eudryas grata* among the *Notodontiadæ*. Fabricius suggested that *Bombyx Venutia* (*Venulia* of Cramer) with *Bombyx grata*, ought perhaps to constitute a peculiar genus. The former is the type of Latreille's genus *Ægocera*, one of the *Agaristiadæ*, a family belonging to the Sphinx section of the Lepidoptera. The antennæ, both in *Agarista* and *Ægocera*, are stated by Latreille and others to be fusiform, that is, thickened in the middle and curved at the point; and the discoidal cell of the hind wings is said to be open. As far as the transformations of these insects have been observed and described, it appears that their caterpillars are sparingly covered with hairs, and envelop themselves in silken cocoons; those of the New Holland genus, *Agarista*, are fastened to the stems of the plants on which the caterpillars live, and those of the North American species, now constituting the genus *Alypia*, are made upon, or just beneath the surface of the ground. In *Eudryas* the antennæ are not fusiform, and not curved at the end; the discoidal cell of the hind wings is closed by a nervure or vein; the caterpillar is not at all hairy, and buries itself in the ground without making any kind of cocoon whatever. It must nevertheless be confessed that there is a striking resemblance in the form and coloring of the caterpillars of *Agarista glycinæ*, *Alypia octomaculata* and *Eudryas grata*; and, moreover, the last two live upon the grape vine, and their postures are exactly alike. Taking into consideration those characters in which the caterpillars agree, we must admit that Dr. Boisduval had some reason for placing *Eudryas* near to *Agarista* and *Ægocera*, as he has done on the fourteenth plate in the first volume of his Species général des Lépidoptères. Some of the English entomologists, whom I have consulted, think that *Eudryas* ought to be put among the *Noctuæ* near to *Acontia* and *Euphasia*, in which opinion I cannot agree with them; for the caterpillar of *E. grata* has all its legs perfect, and does not arch the body in creeping. On account of its hairless body, the humped tail, like that of *Notodonta dictæa*, the want of a cocoon, in which it agrees with *Pygæra*, and its simple and tapering antennæ, which, with other characters, seem to me to exclude it from the *Agaristiadæ*, I still leave it, although with some hesitation, among the *Notodontiadæ*, where I had first placed it.

Astasia torrefacta? Sm.-Abb.

July 23, 1828. Found on the burdock; eats leaves of willow well. Body cylindrical, above pale yellow, beneath greenish black. Segments very distinct, almost annulose, sides and incisures greenish yellow, head of same color, tips of mandibles black; no tubercles, but the body is covered with lanuginous hairs, flexuous backwards, of a pale sulphur color; second segment above, with a long plume of ferruginous hairs, directed a little forwards; the same segment has a conspicuous, transverse, oval spot each side; third segment with a black spot each side; fourth to ninth inclusive with an interrupted black line or on each a linear, dorsal, black spot furnishing a short fascicle of a few erect black hairs; legs blackish; prolegs thick at base, pyriform or tapering at tip, and furnished with a semicircular, unguiferous, red plate. The hairs are all simple or unbearded.

July 24th, A. M. Cast its skin. The wool which now covers it is of a beautiful white color, the hairs being all directed backwards, except those of the first segment, which curve forwards; second and third segments each side with a dorsal plume of erect hairs, nodding backwards, blackish at tip; penultimate segment with a tuft separating into two depressed plumes; dorsal segments each with a short tuft of erect, black hairs ; sides with an arrow shaped, blackish spot, not furnishing hairs.

Aug. 3d. Divested itself of its long hairs, and appeared only thinly covered with short ones; length nearly one and one fourth inches.

Aug. 6th. Became a pupa, without a cocoon; it would probably have entered the earth, if permitted.

Aug. 4, 1838. Found on a leaf of *Prunus virginiana*, a caterpillar with the body pale yellow, covered with flexuous yellow hairs, and an orange colored pencil, tipped with black, on the anterior part of the eleventh segment.

Aug. 7th. Changed its skin, the hairs became white, a pencil on the second, third and eleventh segments black, and very short, black tufts on each of the intervening segments. Body beneath ash colored; prolegs with deep orange colored cushions.

Pygæra gibbosa? Sm.-Abb.

Found on oak on Prospect Hill, at Waltham, Sept. 2, 1848.

Pale green, dotted with white, and with a white interrupted line on each side of back above the lateral fold. Tail cover edged with pale yellow; spiracles orange. Head round, somewhat rough; mandibles deep yellow at base; upper lip bifid, white; ocelli black, on a white curved line. Legs equal, sixteen, rather short, green. Body green below, dotted with white. The white dots on the back run together so as to form transverse, wavy lines. Form like Abbot's figure. Does not raise head or tail when disturbed. Length one and thirteen sixteenths inches.

Pygæra ministra Drury. [Pl. II, fig. 4.]

Larvæ gregarious, on the apple tree. Figured August 30, 1820. The eggs from which they proceed are laid on the under side of one of the last leaves at the extremity of a branch of the apple tree, and are about one hundred in number. At first the caterpillars eat only the cuticle of the under side of the terminal leaves, but in a few days they are able to devour the whole of a leaf, excepting the principal centre vein. They eat the leaf at its edges, beginning at the base and proceeding towards the tip. The whole body of the caterpillar is scantily covered with long, whitish, curved hairs. When young and until about two thirds grown, the general color of the body is brownish, with white lateral stripes, the three uppermost stripes on each side being quite narrow. After this the white stripes become much wider and are changed to yellow, and the intervening brownish portions become black; so that the full grown caterpillar may be described as yellow, with a dorsal and three lateral black stripes on each side; the head is black, the neck or upper part of the first segment is yellow, as are also the first joints of the legs, of which there are sixteen; the hindermost pair of fleshy legs are rather long and entirely black, and separated from each other so as to give the tail a forked appearance when elevated. The posture of these caterpillars, when not eating, is very odd; the body is bent, with both extremities turned upwards, being supported then by the four intermediate pairs of fleshy legs. They have also a singular jerking motion of the head backwards when disturbed, either by being touched, or even by gently shaking the branch upon which they happen to be, and then bend themselves still more into the form of the letter U. These caterpillars appear about the last of July or first of August, and other broods continue to come forth till the 20th or 30th of August,—at least this was the case during the year 1820.

On the 15th of August, 1822, I found some about two thirds grown. They feed from thirty-five to thirty-seven days or about five weeks. The individuals of each brood keep together upon the branch where they were hatched, devouring in their progress every leaf from the extremity downwards to the trunk. I have seen branches eight feet in length thus stripped, without satisfying them; after which they attack the branch which happens to be nearest to them. As they move along they carry a silken line with them; and they form under the branch a sort of network[1] with silk to which they retire for protection during high winds and rainy weather. They change their skins twice at least, perhaps a greater number of times.

These two moultings I observed to take place on the 20th and 26th days of their age; but I never discovered any other changes of their skins while they remained in the caterpillar state. The largest caterpillar of this kind that I have seen measured one inch and three quarters in length. At the end of five weeks they cease feeding, descend from the trees, enter the earth, and within twenty-four hours afterwards are changed to chrysalids of a brown color. Their descent always takes place during the night, and on the following morning not one of the brood will be seen on the tree. Those which I fed in flower pots half filled with earth became chrysalids in the earth, and remained in the pupa state till the 20th of July of the following year. On the 22d July, 1821, I also found two of the millers apparently just disclosed from the pupæ on the side of a building in the open air.

Aug. 2, 1848. Larva found on Andromeda. Black above and beneath,

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[1] This was added to the original notes at a subsequent time. Does it refer to this insect, or to some other nearly like it?

with four interrupted, white lines on each side, the lowest coinciding with the abdominal fold. Head, a spot on top of first segment, tail clappet, and legs deep rufous red, almost sanguineous. Hairs white. The white lines are widely interrupted in the middle of each segment, and less widely at the incisures. A red spot on each side of the fourth and fifth segments and also of the tenth and eleventh segments, corresponding with the legs on the other segments. Two inches long. Larvæ seen Aug. 8–30. Changed to pupæ Sept. 2–27. Imago, July 15–22.

Clostera americana Harr. [Pl. III, fig. 3.]

August and Sept., 1835; gregarious caterpillars on the Balm of Gilead tree; folding up the leaf and lining it with silk as a common web, the petiole being also fastened to the trunk by silk.

Color of the larva yellow; head, geminate tubercles on the fourth and eleventh segments, tip of last segment and true feet, black; three narrow dorsal and three broader lateral vittæ, and spiracles, black. The larva is much like that of *Clostera anachoreta* Ernst, 165, f. 214, and *C. reclusa* Ernst, 165, fig. 216, and closely resembled *C. anastomosis*. Thin cocoon formed in a box Oct. 4, 1835. Another cocoon formed in October, 1837, disclosed the imago June 15, 1838.

August 10, 1838. Found the larvæ in great abundance on the Balm of Gilead tree. These caterpillars are gregarious, and form a common shelter consisting of a leaf folded longitudinally and lined with a thick web of silk beneath which the insects are sheltered when not feeding. They eat the whole of the leaves except the veins, which remain untouched. The petioles of the small leaves used as habitations are fastened with silk. The larger leaves subsequently used for shelter are not thus secured. They do not eat the leaves which serve for habitations, but sometimes fold one half of the leaf and eat the corresponding side. When fully grown the caterpillar measures one inch and a half or more in length. They do not vary in color or markings at different ages. Body slightly hairy, light yellow, the head, true feet, a double wart on the fourth, another on the eleventh, anal valve, three slender dorsal stripes and three broader lateral ones on a dusky ground, and the spiracles, black. In the oldest caterpillars there is an orange colored line at the sides of the body below the spiracles. The upper, lateral, black stripe is the broadest and becomes indistinct towards the second, which gives to the sides the appearance of a broad, dusky stripe marked with three black lines.[1] The thinly scattered hairs on the body are whitish, and proceed indiscriminately from the surface, and not from regular tubercles.

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[1] The middle lateral line is very slender, the lower one broader, more distinct than the upper one; and below it, between and below the spiracles, are irregular blackish spots which sometimes run together so as to resemble a fourth line. The tubercles have hairs as well as the body.

Apatela americana Harr.

This larva feeds on the elm as well as on the maple; my specimens were from the elm.

Body above greenish yellow; head, last segment, feet and all beneath, black; covered above with diverging fascicles of short yellow hairs, with two long black pencils on the fourth and sixth segments, and one on the eleventh.

Oct. 1, 1827. Found on the chestnut tree a larva measuring one inch and three quarters in length; of a pale green color, the head and corneous feet polished black; first three, last two segments and body beneath blackish; dorsum covered with yellowish hairs; the fourth and sixth segments with two elongated fascicles of black hairs, and the eleventh segment with one black fascicle. No tubercles. Six true and ten false feet. Demi-cocoon of two coats affixed on one side to the plane on which the insect was placed; outer coat of coarse texture, interwoven with hairs of the caterpillar; inner coat of closer fabric with fewer hairs. The perfect insect came out July 18, 1828.

Acronycta sagittaria Harr. MSS. [**A. occidentalis** Gr. and Rob.]

Sept. 1–10, 1846. Larva on plum and other trees. Habit of a *Gastropacha.*

Prolegs ten, equal. Head rather large, somewhat cordate, brown, rough, with punctures. Body ash gray, with a dorsal white stripe on each side of back, from the fourth to eleventh segments inclusive. A large blackish wart on the eleventh segment; on the fourth to tenth segments, a transverse oval, black spot with four white tubercles on it, placed in a transverse, curved line, the convexity anterior, the middle tubercles smallest; two orange dorsal spots on the same black spot, one before and one behind the white tubercles. A single transverse row of tubercles on the first, second and third segments, of an obscure rusty tint; also about four tubercles on each side of each of the other segments. All the tubercles produce a few gray hairs, those near the head and lower side of the body being longest, forming fascicles which nearly conceal the legs. Fore legs brownish black, other legs ash colored. Body beneath ash colored.

One made a loose cocoon of coarse silk in a box, Sept. 10, 1846.

A similar larva was found on mountain ash, June 25, 1848, and began to make its cocoon of silk under cover of a leaf, July 7. Winged Aug. 3, 1848. Another was winged April 22d, 1848.

Sept. 24, 1847. Larva on cherry tree. Dusky bluish gray, with a white stripe on each side of the back, longitudinally divided by a slender dusky or grayish line. The whole stripe is indented on the upper side on each segment by the transverse, dorsal lozenges, of which there is one of a deep velvety black color on every segment except the first three and last two; there being seven of these lozenges, each one with two rust red spots on it, forming a longitudinal row, and four polished, whitish tubercles, two and two. Eleventh segment with a somewhat pyramidal, opaque, black, wart-like prominence, having four minute, black, piliferous tubercles on it. First three segments each with four blackish, piliferous tubercles. Head black, polished, indented on the top, the hairs of fore part of the body curved over it, a row of minute, piliferous tubercles on each side of the body, one above and one below each spiracle; the latter are black. Hair copious at sides of body. Legs black, prolegs grayish black. Cocoon covered with a leaf, Sept. 30, 1847.

Abridged description. Bluish gray, with a white stripe on each side of the back, a dorsal series of seven black lozenges, each having two rust red spots and four whitish, piliferous tubercles. A pyramidal black wart on the top of the eleventh segment. Head and prolegs of polished black. Sides of the body hairy.

Acronycta ulmi Harr. MSS. [Pl. III, fig. 10.]

Sept. 13, 1841. Found resting extended on the trunk of an elm.

Greenish yellow, variegated with dusky on the sides, with yellowish lateral warts, two zigzag, dorsal, black lines inclosing a paler, dorsal line, and a series of dusky, oval spaces; a tubercle surmounted by four little black warts on the fourth ring, another on the seventh ring, and a third on the eleventh ring. Head black; legs black; body beneath and prolegs greenish yellow.

On each ring three warts on each side; those on the first ring are directed forwards, and produce long hairs also curving forwards; the tubercles are pale yellow and large, one above, and two below the spiracles, which are black. On the first four rings a dusky, lateral, broad stripe between the two upper tubercles; behind the fourth ring the dusky stripe becomes spread and broken into little spots or lines between the tubercles; moreover, the sides are sprinkled with minute yellow warts, which produce very short, gray, truncated hairs; the yellow warts furnish bunches of much longer, tapering hairs; on the top of the back is a grayish line caused by a continuous row of short, truncated hairs of this color behind the fourth ring; before it the line is distinct and not so hairy. The whole back is marked by a dusky row of ovals, externally black, internally brownish; and on the fourth, seventh and eleventh rings, as before said, there is a hump surmounted by four black warts, in a transverse line on the first two humps, and in pairs, and two on the eleventh ring. The head is large, and somewhat cordate above, polished black.

Sept. 15, began to enclose itself, and made a tough cocoon in a box. Winged June 10, 1842.

Found two more larvæ on a fence under elm trees, Sept. 8; cocoon made Sept. 12; winged June 11.

Acronycta americana Harr. MSS. [Pl. III, fig. 2.]

Sept. 20, 1841. Found at Lowell. Would not eat willow, poplar, or lime leaves.

Greenish brown, or nearly black; head subquadrate, bifid above, chestnut brown; each segment above with a transverse, oval, greenish yellow spot, having a transverse, depressed line in the middle; about four elevated, black dots on each side of each ring; and the body beset with a few long, black bristles dilated at the end; feet black. The segments have deep incisions between them; the long, black, spear-headed hairs grow from the skin and not from warts; there are two longer than the rest on each side of the yellow spot on the first ring, and one on each side of the spots on the fourth to the ninth rings inclusive, and the same on the eleventh and twelfth rings; but there are none on the second, third and tenth rings. The spiracles are black. This caterpillar moves very quickly, and rests with the fore part of its body bent sidewise.

Chrysalis under a leaf, fastened to another with a few threads, Sept. 25, 1841. Winged June 28, 1842.

Acronycta pruni Harr. MSS. [Pl. IV, fig. 13.]

August 6, 1828. Found on ground; perhaps comes near the genus *Episema*. See Ernst, 186, fig. 242.

Color brownish purple. Head white spotted with black. Body subtuberculate; tubercles setiferous; hairs black. A dusky dorsal line. First segment with two obsolete tubercles near the anterior edge. Two dorsal, golden yellow lines diverging before, and inclosing a dark brown spot. Second segment with two similar yellow lines, continuous with the first and second dorsal tubercles; remaining segments each with two contiguous, dorsal tubercles (and on each side one minute or obsolete tubercle) of a yellowish color. The dorsal tubercles are longest on the last segment, and next in length on the second, from which they gradually diminish till they become obsolete on the sixth. The lateral tubercles are obsolete on the second segment, but gradually become larger and more apparent on the sixth and remaining segments. Immediately in front of the dorsal tubercles of the twelfth segment are two very minute ones.[1] Stigmata black. Feet and ten prolegs purple brown. Posture like the larva of *Eudryas grata*.[2] Length, when extended, over one inch.

Cocoon of silk interwoven with fragments of wood from the box in which it was kept. Aug. 7.

Found the same larva on a fence, Sept. 6, 1841. It made a cocoon of folded leaf lined with a thin tissue of silk, against bottom of box, Sept. 8, 1841. This larva was destroyed by a parasite, which threw off the larva skin and disclosed a dark brown chrysalis pod, from which there came the perfect *Anomalon*, June 10, 1842.

Sept. 7, 1849. On plum tree. Body laterally compressed, that is, higher than wide, green. Head white, banded at the sides with purple, and spotted or dotted with black; a triangular brown spot edged at sides with white on top of first segment; an oval brown spot edged with white on top of second segment; two slender, blackish lines thence to tail, approximated on the third, fourth, fifth and sixth segments, separated on the seventh and eighth segments, and enclosing there on each a lozenge shaped, brown spot, gradually approximated again on the ninth and tenth, and proceeding close together to the anal prolegs.

Two minute, reddish, setiferous tubercles on each of the segments except the first and twelfth segments; those on the second being elongated; and those on the eleventh being situated on the top of an elongated conical projection.

The same larva on mountain ash, winged June 14; another June 6.

Acronycta salicis Harr. MSS.

Caterpillars found on various plants in meadows, and on the *Rosa carolina*, Aug. 1, 1838. Length one and one half inches.

Black; head, posterior half of the last segment, prolegs, body beneath and on each segment in a transverse series ten tubercles, radiated with rusty spines, crimson; three of the tubercles on each side are above the spiracles and two below them, and contiguous to each other; on each side between the first dorsal tubercles a longitudinal series of white spots; and between the spiracles, which also are white, a series of ten large, yellow, reniform spots, small before, and largest on the sixth, seventh and eighth segments, and a smaller circular one on the eleventh segment. Lip and base of antennæ white; true legs black. Legs sixteen, all of the prolegs equal in length. Gait regular, creeping.

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[1] The tubercle on the last segment is bifid and setiferous, and longest of all. Those on the second segment next in length.

[2] Sometimes rests with the first pair of prolegs elevated. Often rests with the head bent down and turned sidewise below the plane of the legs.

One formed its cocoon about Aug. 3, 1838.

Found two on willow in August, full grown; figured Sept. 16, 1849.

Black, with garnet red setiferous tubercles, hairs brown and short, and a row of brilliant, citron yellow spots on each side, in the line of the stigmata, and two dorsal rows of small, irregular, white spots. The tubercles on the eleventh segment largest, and elongated slightly. The white dorsal spots are about four on each segment, two on the anterior and two on the posterior edge. The lateral yellow spots are double, half being on the posterior edge of one, and the other half on the anterior edge of the following segment; between the spots a black space, in the middle of which is the white spiracle above, and a tubercle just below it. There are about ten tubercles to each segment, nearly in one transverse row, six above the yellow line, and two on each side below it. Head, legs and prolegs, black.

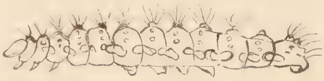

Fig. 44.

This beautiful larva is easily known at all ages by its deep black color and row of conspicuous yellow spots on each side, with the two rows of irregular white dots above. It rolls in a ball sometimes when touched. These specimens differ from the one previously described in being entirely black above and below, except the tubercles and rows of white and yellow spots.

Cocoons made in box, Sept. 17 and 18, 1849.

Caterpillar in Potato-stalks.[1]

July 8, 1848. With ten prolegs and six true legs, a corneous plate on first and last segments; four black, shining points, two and two, on the back of each segment; a lateral row of much larger ones on the sides (of which there are three on the side of each segment, one large and two small, besides the black spiracle making a fourth black point), and also below the lateral line two more black points on each side of every segment, those on the segments furnished with prolegs, being on the sides of the prolegs themselves. Length nine tenths of an inch. Elongated, slender, pale purplish brown above, with three dorsal white lines, the central one continuous, the others interrupted on the middle of the back, from the fourth to the seventh segments inclusive (these three lines begin on the second segment). On the sides of the first and second segments there is an abbreviated, white stripe, and above the third and fourth prolegs another white stripe. Head, dorsal and anal plates wax

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[1] [See Harris, Treatise Inj. Ins., 3d edition, p. 440.]

yellow and shining, edged laterally with shining black. Legs black. Prolegs and body beneath pale yellow. The head of this caterpillar is large, subquadrate, not retractile. The legs and prolegs long, and the motion very active. The livid brownish color of the intermediate segments extends more or less in different specimens under the body of these same segments. Motion somewhat like that of a Geometrid, the back arched, and the first pair of prolegs, though as long as the others, not used in creeping.

Found one also in pigweed stalk, July 5, 1851.

Agrotis sp.

July 9th, 1848. From cabbages. Length one and one quarter to one and a half inches. Very minutely granulated above. Head small, retractile. First ring with a brownish corneous plate. Last ring with clappet shining and brownish, divided lengthwise by a pale line in the dark colored individuals, the same ring in others not conspicuously darker or more shining than the rest of the body. Legs sixteen, whitish.

Curls laterally and conceals the head by retracting it completely when disturbed. Each segment with four dorsal, black, shining, tubercular, setiferous points, and two tubercular points on each side above the lateral fold, and near to the black spiracle. On all the segments except the last (clappet) the tubercular points on the back are in two rows or pairs, the anterior pair more approximated than the posterior. On the last segment the four points form a semicircular, transverse row. The color of the specimens varies. The darkest are of a dusky or bluish black color above, and bluish ash colored below, with a greasy appearance. The lateral fold below the spiracles is whitish; and there is a broad, pale stripe down the back divided by a dusky, longitudinal, dorsal line. Head pale brown, mottled with black on the cheeks and above, and with the eye spots also black; anterior triangle, palpi, and feet pale. Dorsal plate on the first segment brownish black. Anal plate pale brown, and with four blackish blotches. In other individuals (and these appear to be the most common and the oldest) the dorsal stripe and pale line are not conspicuous, and the whole insect may be said to be dusky or bluish black above, livid or paler below, with shining black, setiferous points on the segments, and the lateral fold rather paler than the rest of the body. The head and corneous plate on the first ring bluish. Anal clappet horny and blotched with brown. Legs whitish. Some individuals are found of the same pallid or livid color above and below, in which also the lateral boundaries of the dorsal band are distinguished by being somewhat darker than the rest.

Hadena amica.

June 1st, 1850. Cut-worm that cuts off currant shoots.

Length above one inch and a half. Brownish; livid and shining above, opaque beneath. Head rather small, heart shaped, castaneous; a semilunar shield on the first segment, above of the same color and horny; last segment with a small, brown, corneous shield. A few scattered hairs on head and body, the latter mostly springing from the ordinary wart spots. Prolegs ten, rather short. Winged July 1st, 1850.

Mamestra persicariæ? *var.* **americana**. [Pl. I, fig. 11.]

Sept. 20th, 1841. Two specimens found on the grass. Pale yellowish green, or dark pea green, with the eleventh segment pyramidally elevated; top of the first ring olive green or blackish and divided into four dark, quadrate spots by three longitudinal, whitish or light green lines; a continuous, pale, dorsal line, an olive green, semicircular spot on the top of the fourth and fifth rings, a triangular spot of the same color on each side of the pyramidal elevation, and a row of narrow, semicircular, greenish lines, paler behind, on the intervening rings; the sides obliquely marked with dark streaks widening below and confluent just above the feet.

Easily distinguished by the two semicircular dark spots on the back, and the oblique streaks on the sides. Two varieties, one pale and one dark green. I fed it with the leaves of *Polygonum persicaria*.

Chrysalis in the earth Sept. 24th, 1841. Winged, June 4th, 1842.

Mamestra leucostigma Harr. MSS.

Larvæ abundant under the decaying leaves of cabbages on the ground. A double series of triangular black spots on the back, largest towards the tail, and diminishing to nothing towards the head.

Went into the earth Oct., 1822. Winged insect came out June 17, 1823.

Mamestra picta Harr.

Sept. 28th, 1841. Light yellow, with a broad black dorsal stripe, bounded on each side by a narrow, deep yellow line (on which there is a black dot on the middle of each ring, and the sides of the black stripe are also dotted with white); another yellow line just below the spiracles; sides between the yellow stripe white, with transverse, letter-like, black characters (like the runic); a narrow space below the yellow line is also white, with irregular black spots; spiracles white; head, feet and the whole belly light yellowish red. Body very smooth, without tubercles. The hairs are few, very small and imperceptible to the naked eye; head rounded, rather small; gait regular, creeping; when disturbed rolls up in a circle.

Chrysalis Oct., 1841. Winged June 13, 1842.

A specimen found Sept. 17, 1849, was light yellow above and beneath, with three broad, black stripes, bordered with white, one of the stripes dorsal, and the others lateral, the lateral stripes consisting of transverse, letter-like, black characters on a white ground; but the white ground seen without a glass appears pale blue. Head and anal prolegs pale red.

Found eating the leaves of cabbages in Sept. and Oct., 1822. Entered the earth Oct., 1822. Winged insect came out June 17, 1823.

Noctua sp.

Oct. 27, 1841. Three specimens found crawling on the library walls. When handled they curl up like the larvæ of the *Arctiæ*, or of *Cimbex*.

Smooth, subcylindrical, and with sixteen perfect legs, a broad purple brown stripe on the back (narrowed to a point behind); bordered on each side by a narrower, pale yellow stripe, the latter edged with black above; below the yellow stripe a wider one of a purple brown color, paler than the dorsal stripe; just on or above the line of the spiracles a black line; below this a yellowish white stripe, equal in breadth to the yellow stripe above; upper part of the first segment with two black stripes between the yellow ones. Head, body beneath, and prolegs, pale red; true legs pale ochre yellow, with blackish claws. Length one inch and a quarter.

Contracted Oct. 29, 1841, and became chrysalis Oct. 31. Winged Aug. 10, 1842.

Noctua sp. [Pl. I, fig. 9.]

Sept. 28, found on *Smilax rotundifolia*, and was much larger than the figure.

Smooth, subcylindrical, with sixteen perfect feet, and with three rich purple brown stripes between four narrower yellow stripes. The two upper yellow stripes are banded on each side by a narrow black line; the lowest yellow stripe, containing the spiracles, is narrower than the others, and is bounded below by a purplish red line; body beneath whitish; head pale red; legs reddish white, except the last pair, which are more decidedly red.

Went into the earth on the 28th.

Euclidia? erechtea Cramer.

Oct. 21, 1847. Found larva on fence, and another on a dead leaf.

Brownish flesh color, with darker longitudinal stripes, and two similar stripes on the head, two black dots on each side of the body in the intersections between the fourth and fifth, and fifth and sixth segments, shown only when the larva is contracted, as in the figures. Anal prolegs very long, divaricated; abdominal legs four, on the eighth and ninth segments. Posture in repose, as in the figures [supra, p. 175].

Cocoon in a leaf same day.

Oct. 30, 1849. Found climbing on the trunk of a tree.

Prolegs six; two on the eighth, two on the ninth, and two on the last or twelfth segment. Body cylindrical, attenuated behind. Head rounded, slightly indented above, brownish white, longitudinally striped with twenty-four brown lines in contiguous pairs. Body clay brown, with two dark brown dorsal stripes, each composed of three approximated lines. Between these stripes are two fainter, approximated lines along the middle of the back, more distinct before than behind. Each side of the body above the lateral fold with six faint, slender lines in pairs; a dark brown one on the lateral fold, in which are situated the dark brown spiracles. Several faint brownish lines in pairs beneath the lateral fold, and a broad black stripe in the middle of the body beneath. Abdominal prolegs livid, a few blackish dots on each segment, most conspicuous on the sides near the lateral fold, and on the dorsal stripes. Two black dots in the intersections between the fourth and fifth segments, and two more between the fifth and sixth segments, seen only when the body is curved upwards. They are on the dorsal stripes.

Parthenos nubilis Hübn.

Sept. 3, 1849. Found on ground under *Robinia.*

Wood gray or light cinereous brown, with two darker, irregular, dorsal stripes, laterally indented and forming almost a kind of chain on the back, on each side of which is a row of white points (two in each segment, on each side); below these a similar but much more irregular, dilated and wavy, double, dusky stripe, including the blackish spiracles, and about three white points to the side of each segment. Head reddish gray, marbled with brown. Prolegs with an external, longitudinal, brown stripe; anal pair very long, all the rest progressively (forward) shorter, the first pair being so short as not to be used in walking. Body beneath dirty white, with a row of lozenge shaped blackish spots in the middle. Motion geometrideous. Attitude in repose generally stretched at full length. Sometimes with head and body curled as in *Euclidia.* Length one and four fifths inches.

Sept. 6–12, 1852. Hides itself in holes of the trunk of *Robinia pseudacacia*, and comes out at night to eat the leaves.

Length two inches. First pair of prolegs rather smaller than the others, and rarely used in creeping or resting. Color brown above, finely dotted and variegated with dark brown; body beneath pale brown, with a black spot between the prolegs, and a blackish streak beneath the last three segments. Two zigzag, brown lines (almost black posteriorly) form a series of lozenges along the back, one lozenge being on each segment, and becoming gradually narrow behind. Each lozenge, especially those of the hinder segments, has a black spot near the hind angle. A pale line on each side below, and contiguous to the spiracles, and in young specimens a dark brown line above the spiracles. The latter are black. Head round, dark brown, but spotted with pale points in clusters. Top of first segment marked with a semicircular, darker, but not horny, spot. Legs pale brown as the belly. When disturbed snaps its body in all directions, curling and uncurling it.

Pupa in a loose web on surface of the ground. Winged June 18, 1853.

Catocala sp. [Pl. IV, fig. 8.]

June 10, 1841. Found on the oak tree.

Ash colored, with a white fringe on each side of the belly, a whitish spot on the side of the fourth segment, a crescent shaped, brown spot on the sides of the eighth and ninth segments, and an oblique, brown line on each side of the eleventh segment; a long wart on the top of the eighth, and two warts, or a bifid one, pointing backwards on the eleventh ring. Each segment has four small, round tubercles on the top, and three each side, except the first, which has none, the second and third, which have only two dorsal and two lateral tubercles, and the last, which has only one lateral. Head cordate above, margined laterally with brown. Under side of body white with a purple black round spot in the middle of the sixth, seventh, eighth and ninth rings.

This caterpillar walks like a looper, its first pair of prolegs being shortest, and it arches upwards the fourth, fifth, sixth and seventh rings, so that the first prolegs scarcely touch the branch along which it moves. When disturbed it jerks its body laterally with great force, so as sometimes to leap to a considerable distance.

Cocoon and chrysalis June 15, 1841. Winged July 5, 1841.

Ennomos philyria[1] Harr. MSS. = **Tiliæ** Harr. MSS. [**Ennomos magnaria** Guén.]

August and Sept., 1849. Stick-worm on the *Tilia*.

Larva makes an oblong oval, tough but thin, paper-like cocoon, open or loose at each end. Pupa large, covered with bloom.

Winged Sept. 25–27, 1849. Wings deflexed, but partly raised in repose, so as to show the under side laterally.

Abraxas? ribearia Fitch.

June 26, 1848. Received from Salem, N. York. Larva lives on currant. Legs sixteen. Body pale yellow spotted with black above and beneath.

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[1] From *φιλύρα*, the Linden.

Prolegs the same. True legs yellow, with black rings at the end of the joints.

Length of full grown larva eight tenths of an inch. Head obtuse, rounded, yellow, with two large, black, rounded spots above, a transverse, black band before, and a smaller black spot each side, including the ocelli. First segment with four dorsal and on each side four black dots and a larger one in the region of the spiracle, second and third segments like first, remaining segments each with four dorsal dots in two rows, two larger lateral ones before and behind each other, the anterior of which is the larger and more rounded. A similar row of large spots in line of spiracles, and between this and the upper row several black dots, two or three to each side; below the spiracular row and the belly, spotted or dotted with black. The spots on the tenth, eleventh and twelfth segments diminish and become confused. Clappet edged with black.

Chrysalis naked, simple, tail ending with a bifid spine, June 26. Winged July 16, 1848.

Geometra catenaria Drury.

July 27, 1841. Larva on the wood-wax (*Genista tinctoria*) near Salem.

Legs ten. Attitude at rest like that of *Hybernia defoliaria*. Body thickest behind, tapering before, elongated. Head nearly hemispherical, indented like a V on the front, but not above. First segment entire, unarmed. Remaining segments simple. Color above and beneath bright lemon yellow.

Head, first and last segments, and joints of the legs spotted with black; the dots on the head being about ten, in two transverse rows, six and four, not including two on the V-shaped part. On the intervening segments four longitudinal, slender, brown lines on each side, the lowest in a line with the spiracles, and interrupted by them and by spots corresponding to them on the side of each segment. Four similar, longitudinal lines below the spiracles on each side of the under or abdominal surface of the segments. The spiracular spots on the first segment consist of two black dots; on the second and third and remaining segments, to the eleventh inclusive, they are white, with two small, transverse, black spots, one on each side of the white portion, and a black dot just below the central white portion. The prolegs are on the ninth and twelfth segments, or rather between the ninth and tenth, and on the twelfth. Length one inch and a half.

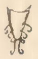
Fig. 45.

Pupa white, with distinct, black, linear dots, and with the three middle abdominal incisures orange yellow. Tail ending in two long, excurved hooks, and with six other incurved hooks in pairs before the extremity,—see Fig. 45.

The moth rests mostly with wings half erect, but deflexed, especially the females. The male, after flying, often alights and rests with wings nearly horizontally deflexed, in a deltoid form, sloping downwards.

Pericallia quercaria Harr. MSS. [**Nematocampa filamentaria** Guén.] [Pl. III, fig. 5.]

June 10, 1841. Found on an oak tree. Attitude in repose as represented in the figure.

Grayish; head spotted with brown; first three rings dusky at the sides, fourth and fifth brown at sides and on the top, with a dusky lateral streak; sixth, seventh and eighth rings with a blackish stripe on each side, on the eighth passing obliquely upwards and backwards, and meeting a dusky stripe on the top of the ninth, tenth, eleventh and twelfth rings. Legs ten, gray. Two short brown tubercles on back part of fourth ring, immediately behind which on fifth ring are two small, white warts; on back part of fifth ring two slender, tentacular horns, of a gray color, blackish towards the end, and tipped with white; these are movable, can be straightened or unrolled, and lengthened and shortened, but are usually curled over the fourth ring. On back part of sixth ring two similar, tentacular horns curling backwards; before these are two small, gray warts; on each of the following rings two gray warts, those on the eleventh ring the most prominent.

Chrysalis in imperfect cocoon, June 15, 1841. Winged before the 8th of July, 1841.

Found another larva on the willow about June 12, and still another on the rose, June 18.

Hypæna humuli Harr.

July 10, 1841. Larvæ on hop. Most of them had then left the vines. This was fully grown.

True legs six, anal prolegs two, abdominal prolegs six, total fourteen. Body long, cylindrical, tapering at each end. Green, with a deeper green, dorsal line, and a longitudinal, whitish line on each side of the back; a faint, inconspicuous, whitish line on each side just below the spiracles. Head green, regularly spotted with small, black, piliferous dots, as also is each segment, the dots of which are arranged in two transverse rows. Intersections deep and distinct. Legs green. Geometrideous in its gait. Length eight tenths of an inch.

Botys? sp. [**Pionea eunusalis** Walk.] [Pl. IV, fig. 18.]

Oct. 30 and Nov. 1, 1841. Found on leaves of horse-radish.

They eat large holes out of leaves, leaving finally only the veins untouched. They live beneath the leaves, stretched out by the sides of the midrib. They creep regularly, not haltingly, and move pretty fast. When alarmed or disturbed they curl quickly, and loose their hold, and fall to the ground.

Body fusiform, or cylindrical and tapering at each extremity. Legs sixteen, all perfect. Length three fourths of an inch. Back dark purple brown. A broad, bright yellow stripe on each side, on the line of the spiracles. All beneath yellowish green. Head shining black. Two shining black plates on the first ring. Brown portion of the second and third rings with a transverse row of four black, setiferous tubercles. Remaining rings to the eleventh inclusive, with six similar tubercles on the back, twelfth ring with six, arranged four and two. Sides of the body below the yellow stripe without two black tubercles on the side of each ring. Several minute white dots arranged nearly in two rows on the back, in a line with the upper dorsal tubercles. Each tubercle produces one or two short and stiff bristles, and the dorsal ones have also a white dot on each side of their base laterally. Terminal segments without a black corneous plate.

Found the same on turnip leaves, Oct. 20, 1844, their ravages very considerable.

Porrectaria ? **sp.**

Oct. 25–Nov. 1, 1841. Found abundantly on fences, crawling about.

Head yellowish; first three rings spotted with brown ; body white ; first three pair of legs long, dirty white. The prolegs very close together, of the usual number, but extremely short, consisting only of little tubercles, each with an oval ring of hooks. Tip of the last ring blackish.

This larva inhabits a portable case. In moving it spins a thread, fastening it at every step, so that if disturbed, and obliged to withdraw entirely within its case, the latter hangs suspended by the thread. Length of the case quarter of an inch. The case is rather rough, apparently fibrous, ash colored, and as tough as stiff paper. This case is cylindrical or fusiform ; the anterior end is curved downwards a little and has an opening beneath. The other end is closed by three bevelled lips, meeting in a point, and capable of being opened, when the larva wishes to eject its excrement.

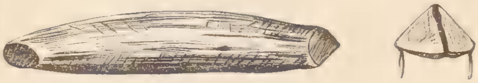

Fig. 46.

The case of this insect somewhat resembles one figured in Réaumur's Mémoires, Tome III, p. 97, plate 7, figs. 1–3, possibly the *Porrectaria anatipennella.* It agrees with the description of the case of *Ornix anseripennella,* in Duponchel's Hist. Nat. Lép. (Nocturnes, Tom. VIII, p. 573, note), except that it is not carinated, but is even on the surface, with two or three little striæ upon it, as if seamed longitudinally. These seams are not placed regularly upon any one side, but sometimes above, sometimes below, etc.

Can the larva live on the woody particles on fences or on lichens ? It is very abundant on all fences in the autumn.

Tortrix ? sp.

Sept. 10–30. Cuts off and winds up spirally portions of the leaves of *Tilia americana*, forming a long, pendulous nest in which the larva is concealed. The larva begins on the under side of the leaf, rolls it so that the upper surface is outwards, and the rolls are fastened by a few transverse, silken bands ; the lower end is enclosed, the upper end generally remains open, and the head of the larva is directed upwards. It eats the inner folds first, and rolls up the leaf as fast as it eats out the inside of its nest. The bottom of the case is full of the excrement, in black grains.

Sept. 13, 1847. Length about one inch. Body dirty pale green. Each segment with a few minute, setiferous tubercles, set in the ordinary order. Head cordate above, rather small, deep chestnut brown, and shining. Top of the first segment covered with a brown plate. Last segment without a plate. True legs, six ; prolegs, ten, of equal length. Gait creeping regularly, not looping. A pale greenish, very narrow, lateral line is visible on each side of the body, and a darker green, dorsal line, apparently the dorsal vessel, seen through the thin and semitransparent skin.

Cocoon under a leaf, Sept. 25, 1848.

DESCRIPTIONS OF INSECTS

SELECTED FROM THE

MANUSCRIPTS OF DR. HARRIS.

ORTHOPTERA.

Acrydium femur rubrum De Geer.

Griseous; head, sides of thorax and abdomen beneath, and an oblique line on the side of the metathorax yellow; posterior thighs sanguineous beneath, yellowish on the inside, with three black spots; posterior tibiæ sanguineous. Length ♂ 9 lines; ♀ 10–13 lines (French).

Head above griseous, face and cheeks greenish yellow; a blackish spot behind the eye; antennæ in the male rather longer, in the female rather shorter than the thorax, filiform, reddish or yellowish at base, fuscous at tip. Thorax griseous and plane above, with a dorsal, capillary, elevated line, which is interrupted in the middle; the sides and beneath greenish yellow; a blackish spot on each side of the prothorax, contiguous with the one behind the eye. Metathorax with a bright yellow oblique line on each side, beginning near the articulation of the wing, and extending to the posterior coxa. Hemelytra griseous, with a longitudinal series of small fuscous spots in the middle of each; wings diaphanous, slightly tinged with pale greenish yellow at base and behind, and with fuscous nervures. Legs griseous, hinder thighs sanguineous beneath, yellowish within and marked above and partially on the inside with three black spots; extremity black; posterior tibiæ sanguineous, the spines black. Abdomen above griseous, margins of the segments pale; beneath yellow.

Described from recent specimens, Oct. 1, 1837. When it is living the oblique yellow lines on the sides of metathorax are very conspicuous, and render this one of the easiest species to recognize.

Locusta curtipennis Harr.

Above griseous, variegated with black, beneath yellow. Hemelytra and wings very short, immaculate; posterior thighs at the apex and top of the tibiæ black. Length ♂ 6–8 lines; ♀ 9–10 lines.

Grisea, nigro variegata, subtus flava; hemelytris et alis brevissimis, immaculatis; femorum et tibiarum posticarum geniculis nigris.

Head pale green, above griseous, with a black spot behind the eye; antennæ fuscous, greenish at base, of the male half as long as the body, of the female as long as the prothorax. Thorax plane, and with three longitudinal, capillary, elevated lines, pale green, griseous above, and with a black vitta on each side contiguous with the spot behind the eyes. Hemelytra and wings semidiaphanous, yellowish, with griseous reticulations. Abdomen above griseous, sides of each segment with a large black spot; beneath yellow, immaculate. Legs pale reddish, or greenish yellow; the tarsi dull red; posterior thighs at tip, and summit of the tibiæ black, spines of the tibiæ black.

Described from recent specimens. The flight of this species is short and noiseless, but it leaps well. It is at once distinguished by its short hemelytra and wings, and the peculiar form of its head, which slopes backwards very much from the vertex to the mouth. Found in meadows and grassy places, from the first of August to the tenth of October.

NEUROPTERA.

Libellula rubicundula Say.

Red; female testaceous at the sides and beneath; wings tinged with fulvous at base, and with an oblong quadrate red stigma. Male red, sides of thorax and legs paler; abdomen with blackish spots at the sides, which become larger towards the tip; a longitudinal line beneath blackish. Female pale testaceous, the abdomen red above, with blackish spots at the sides, as in the male; beneath covered with a white pruina, and with a black longitudinal line. Wings in both sexes alike, hyaline, with red reticulations, fulvous at base, and each with an oblong quadrate red stigma. Apex of the tarsi and nails black.

Described from recent specimens; September and October.

Æshna heros.

♂ and ♀. Chestnut brown, banded with blue green; wings transparent, tinged with yellow; the stigma and nervures brown. Expands nearly five inches.

Front vesicular, pale brown, lip above base of the mandibles, two transverse narrow lines above the lip, and two small spots before the antennæ, blue green. Eyes blue green above, with a large indigo blue patch before, pale and clear ochre brown below. Thorax brown; with two longitudinal stripes before, and two oblique ones on each side, a spot between the latter near the wings, two small spots at the articulation of each wing, and the scutellar portions blue green. Abdomen brown, with a lateral longitudinal line on each side, and two narrow bands near the base, and one near the tip of each segment, blue green, except the first segment, which has only a short terminal band, and the last three segments, the last of which is immaculate, and the two preceding each with a subterminal band, interrupted in the middle so as to form two transverse spots. Anal folioles deep chestnut brown. Legs black. ♂ with the upper anal folioles tricarinate, narrowed at base, and fringed with hairs on the inside; lower appendage half as long as the folioles, flattened above and truncated at tip. ♀ with the anal folioles shorter, lance oval, flat and not hairy. Ovipositor cultriform, with palpiform appendages on each side.

Taken from living specimens, June 10–20, 1839.

PSOCUS[1] Latr.

This genus is allied to *Sialis* in form and disposition of its wings. The genus *Aphis* is its representative among the Hemiptera, to which it has a very remarkable resemblance in general form and appearance, but with an entirely different oral apparatus. The insects of this genus assemble at certain seasons in swarms about old fences, buildings and trees, particularly such as are decayed or affected with dry rot. The larvæ probably live in these places gnawing the wood. The definition of the antennæ in Coquebert is incorrect, for in *Psocus* the antennæ are eleven jointed, the first joint thickest, short, conical; second shortest, turbinated or obconical, not longer than thick; third and remaining joints nearly cylindrical or setaceous, very long and slender, and with articulations which are easily seen with a good glass, and which become gradually shorter towards the tip, the third being the longest of all.

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[1] Latreille was not always correct in the formation of new terms; according to the etymology, the name of this genus should be written *Psochus*.

Psocus lucidus Harr. MSS.

♂ ♀. *Pallide luteus; capite et thorace nigro maculatis; abdominis dorso transverse lineato, serie quintuplici; alis hyalinis, venis et punctis duobus marginalibus nigris; pedes lutei, geniculis nigris, tarsisque fuscis.*

Length from head to tip of wings .25 in.; of body to tip of abdomen .15 in. ♂ rather smaller. On walls of outhouse. Sept. 20, 1836, Cambridge.

Antennæ pilose, longer than body, fuscous, first, second and third joints luteous. Head whitish or pale luteous, with a large, round, polished, black spot between the antennæ; a smaller one containing the stemmata on the vertex between the eyes; and behind this on each side two elongated, quadrate, fuscous spots. Body above luteous, beneath paler; mesothorax with three large, polished, black spots, of which one is in front, and the others on each side before the articulation of the wings, which are also marked with a small black spot; metathorax with four small black spots in a transverse series, and a smaller one at the root of each inferior wing; behind the transverse series an elongated, quadrate spot on the middle of the tip of the metathorax. Pleuræ of the meso- and metathorax each with a black spot above the coxa. Abdomen; edges of the segment blackish; a dorsal and two lateral series of somewhat triangular, blackish spots; between these series on each side a series of transverse black lines; last segment with three large black spots, tip or genitalia with two or three small ones; wings hyaline, nervures fuscous (nervure of the first marginal cell yellowish at base, from which it is continued in a black curve; but with a conspicuous, large, black point on the costal edge of the wing; nervure of the submarginal cell pale or yellowish to just beyond its bifurcation; transverse nervure connecting the discoidal cell with the inner margin also pale yellowish; a larger black point on the inner margin at the junction of the two short nervures of this margin) variegated with luteous, with a round black spot on the middle of the costal edge, and another rather larger before the middle of the inner margin. Legs luteous, articulation of the thigh and tibia with a small black spot; tibiæ pilose, tarsi fuscous.

This insect is larger than *P. bipunctata* Fabr., which it seems to resemble in the disposition of its colors.

Another description of the same. Yellowish or greenish white, spotted with black; wings hyaline, upper ones with a black spot on the middle of the external, and another on the internal edge. Antennæ pilose, fuscous. Length to the tip of the closed wings .27 in. ♂ rather smaller. On fences, nidificating in the cracks; eggs, young, and active pupæ all at the same time, feeding on the wood together, Sept. 6, 1837.

Body short, plump. Head with two quadrate spots on the vertex, an orbicular spot on the front and the region of the ocelli, black; eyes brown; first, second and third joints of the antennæ whitish, remainder fuscous, pilose; tips of the palpi fuscous. Mesothorax with three black spots, of which the central one is orbicular, and the lateral ones reniform. Base of the scutellum (of the mesothorax) black. Metathorax with four small black spots in a transverse series, and a larger, quadrate, black spot on the middle of the posterior margin, with two black spots above the articulations of the intermediate and posterior coxæ. Wings hyaline, somewhat iridescent; superior ones with the circumscribing nervure of the stigma, a small spot on the middle of the costal edge, and another on the posterior margin nearer the base, black. Abdomen with the incisures above edged with black, a dorsal series of black triangles, and on each side two lateral series of abbreviated, transverse, black lines; apex with three larger, subquadrate, black spots.

The black spots on the head, thorax, and tip of the abdomen, are highly polished. The circumscribing nervure of the stigma at base, the bifurcation of the nervures near the middle of the wing, and the transverse anastomosing nervure from the central areole to the inner margin are white. The wings are so perfectly hyaline, as not to be visible at a short distance.

Allied to *P. bipunctatus* Fabr. and Latr. (see Coquebert, Decas I, p. 11, Tab. 2, fig. 3), but evidently larger, and otherwise distinct.

Psocus gregarius Harr. Catal. [**P. venosus** Burm.]

Fuscous; superior wings black, opaque; stigma and nervures, together with the incisures of the abdomen, yellow; feet pale. Length to the tip of the closed wings .37 in. Gregarious on the trunks of trees, sometimes on fences. Milton, August 1, 1829. Cambridge, Sept. 7, 1837.

Body fuscous; head, anterior part of thorax and legs paler; antennæ rather longer than the wings, simple, blackish; palpi, two terminal joints blackish; an orbicular, black, glabrous spot on the anterior part of the mesothorax; hinder margins of the mesothorax and metathorax yellow; upper wings black, opaque, the large, longitudinal nervures from the base to beyond the middle, and the greater part of the costal stigma pale yellow; under wings pale fuscous, diaphanous; abdomen dark fuscous, or black above, with yellow incisures; each of the segments beneath with a pale cinereous, transverse band; legs pale, or whitish; tibiæ above and tarsi fuscous.

This is our largest species. The yellow nervures of the upper wings present a metallic lustre in perfectly mature specimens. It differs entirely from all the species described by Fabricius and Latreille.

Psocus frontalis Harr. mss. [**P. striatus** Walk.]

Yellowish white, spotted with black; front with black striæ; wings hyaline, upper ones with a large, opaque, carpal spot, half white and half black, the inner margin at base, and a spot on the middle of the edge, black. Antennæ pilose, black. Length to tip of the closed wings, ♂ .20 in.; ♀ .25 in.

Body yellowish white above. Head with small black spots, or abbreviated lines on the vertex; region of the ocelli black; front lineated with black, mouth and tips of the palpi blackish; antennæ fuscous, rather longer than the wings, pilose, first and second joints whitish. Thorax black, with a narrow, dorsal, yellowish line, which is continued on the metathorax, between the base of the wings; pleura (sides of the thorax) with about four whitish spots on each side. Wings hyaline, slightly perlaceous, the superior ones with a large, opaque carpal spot, the posterior part of which is black, and the anterior part white, terminating before in a black point; another black spot on the middle of the inner margin, which is also black at the base of the wing; in the females there are two or three contiguous spots, forming an abbreviated, oblique band before the middle of the wing. Abdomen yellow above, white, holosericeous beneath, black at tip, with a dorsal series of black triangles, and two lateral series on each side of abbreviated, transverse, black lines. Legs pale; tip of the thighs above, and tarsi fuscous.

This species is somewhat like *P. lucidus*, but it is a smaller and less robust species, and the different markings of the head and thorax will not permit us to confound them. There are white nervures on the superior wings like those of *lucidus*, and of some other species.

Var.—yellowish white, spotted with black; vertex spotted, and front lineated with black; wings hyaline, upper one with a large, opaque, black and white carpal spot, an oblique, interrupted band before the middle, a spot on the inner margin, and two or three obsolete spots on the disk, black. A spot on the vertex and region of the ocelli black; front lineated with black, upper wings with the carpal spot, as in the preceding, black and white; a spot on the inner margin nearer the base, and an interrupted, oblique band uniting with this spot, black; a spot in the central areole, and between the band and base two or three irregular spots pale fuscous and nearly obsolete.

This might, perhaps, be taken for a distinct species, but it is only a variety of *frontalis*, from which it differs in having the oblique macular band, and in wanting the blackish color on the inner edge of the wing at base, and in the addition of a black spot on the vertex. It is also rather larger than the species.

Psocus nubilus Harr. MSS. [**P. lugens** Hag.]

Variegated with black and white; upper wings opaque, clouded with black on a whitish ground, the margin and nervures spotted with white; abdomen beneath whitish, sericeous, with a terminal, reniform, black spot. Length to tip of closed wings .17 in. Cambridge, on fence, Sept. 8, 1837.

Head fuscous, or blackish, orbits variegated with cinereous; front obsoletely lineated; articulations of the palpi whitish, antennæ shorter than the wings, the articulations annulated with white. Thorax black, the margins and incisures whitish. Upper wings opaque, confluently clouded and spotted with black on a whitish or pale cinereous ground, the margin and principal nervures spotted with white. Lower wings diaphanous, external margin near the tip with minute cinereous spots. Abdomen above greenish white, fuscous at tip, and with three fuscous vittæ; beneath whitish, sericeous, with a large, reniform, black spot near the vent. Legs fuscous, or blackish, the thighs near the tip and first tarsal joint cinereous.

In some specimens there is an oblong greenish white spot on the external submargin near the circumscribing nervure of the carpus.

Psocus quadrifasciatus Harr. MSS.

Pale brown, or fuscous brown; spot on the vertex, and two spots on the thorax, deep brown; wings diaphanous, superior ones with four pale fuscous fasciæ, a darker, central, orbicular spot, and a blackish point on the middle of the external and of the internal margin; antennæ short, simple. Length to tip of the closed wings .13 in. Numerous on a fence south of the college yard, Sept. 9, 1837.

Body either light yellowish brown, or darker fuscous brown; a rounded spot on the vertex, including the ocelli, and two spots on the disk of the mesothorax, darker brown; lip and mouth fuscous; antennæ shorter than the wings, fuscous. Wings semitransparent, superior one with four pale, fuscous, transverse bands, one at the base, one at the tip, and two intermediate ones; a rounded, darker spot in the central areole, and two minute blackish spots on the margins of the wings, one near the middle of the external edge, and the other opposite to it, a little nearer the base on the inner margin; abdomen with the apex and a dorsal series of dots, and with the incisures at the sides, and beneath, fuscous brown or blackish. Legs pale, tibiæ above and tarsi darker.

The three blackish spots and four bands on the upper wings serve to distinguish this minute species from all others.

Psocus pusillus Harr. MSS.

Yellowish; antennæ, clypeus, vertex and disk of the thorax, nervures of the apicial half and inner margin of the basal half of the upper wings, and abdomen beneath, fuscous. Length to tips of the closed wings .12 in. On fence in Cambridge, Sept. 8, 1837.

Body pale greenish yellow; head, clypeus and vertex fuscous; eyes brown; antennæ shorter than the wings, simple, blackish. Disk of the mesothorax fuscous, superior wings greenish yellow at base, slightly fuscous at tip; nervures from the middle to the apex, and inner margin from the base to the middle, fuscous. Abdomen lineated with fuscous beneath.

This is the smallest winged species which is known to me.

Psocus infuscatus Harr. MSS. [**P. sparsus** Hag.]

On a fence, eating the decayed wood, in the larval and perfect state, Aug. 1, 1837. In little troops or swarms.

Whitish, variegated with fuscous, upper wings with a large spot on the middle of the outer margin, and two small spots on the inner margin, white. Varies in being large, and lighter colored, with an oblique fuscous fascia on the upper wings (♀) and smaller, darker, the fascia obsolete (♂).

Yellowish (or greenish) white, variegated with light and dark fuscous; two spots on the thorax, middle of the thighs, tips of the tibiæ and of the tarsi, black; articulations of the antennæ, and carpal spot on the upper wings whitish; abdomen trilineate with fuscous. Head and prothorax minutely punctured with black. Front with five vertical or longitudinal, fuscous lines, one central, one beneath each eye, and one somewhat curved between the frontal and subocular lines; vertex with a fuscous spot. Thorax with two transversely arranged black spots; metathorax with a dorsal fuscous line, and another lateral one below the wings on the pleura. Upper wings minutely spotted and variegated with fuscous; the spots forming an obsolete oblique fascia before the middle and across the apex, and four blackish lunules at the apicial margin; outer margin with a large, irregular, whitish, carpal spot; nervures white, dotted with black; lower wings whitish, with fuscous veins. Abdomen trilineate with fuscous; darker beneath. Legs whitish; thighs with a blackish annulus on the middle (sometimes wanting); tips of tibiæ and tarsi at the end blackish. Antennæ fuscous, with whitish articulations. The larger specimens (♀ ?) are paler.

This species differs from all those described and figured by Coquebert, Decas I, Tab. 2, approaching, however, to the *lineatus* and *variegatus* of Latreille, but evidently distinct from both.

Psocus gracilis Harr. MSS. [**P. signatus** Hag.]

Body black, front white, lineated with black; wings hyaline, the superior ones with an elongated, costal, black spot; legs whitish. Length to tip of closed wings .21 in. Cambridge, June 21, 1835.

Body blackish, with yellowish white incisures. Head with a pale yellow line beneath each eye; front yellowish white, with black lines; eyes very prominent, globose; antennæ shorter than the wings, black; palpi pale cinereous. Wings hyaline, iridescent; superior ones with an elongated fuscous spot beyond the middle of the anterior margin. Legs pale cinereous, or dirty white, with the apex of the tibiæ and the tarsi fuscous. The little cellule near the middle of the anterior edge of the upper wings is linear, and much elongated, and entirely fuscous or opaque. The arrangement of the nervures near the hinder margin differs also in this insect from that which is found in the other species; the wings are not so wide, and the eyes are much more prominent and globose.

It may perhaps hereafter be proper to separate this from the other species under a new generic name. I have seen only two specimens, which were discovered on a fence on the 21st of June, 1835; and the description has been drawn up from these instead of from recent specimens, which may perhaps exhibit characters overlooked in those preserved in my cabinet.

Phryganea sp. [**Neuronia pardalis** Walk. ?]

♂ ♀ *bella, nigro-brunnea; antennis, capite thoraceque supra, nigris; alis brunneis, anticis fulvo-guttatis, posticis fasciâ posticâ latâ guttisque costalibus fulvis. Alarum expansio* 1½—1¾ *unc.*

Body dark brown, antennæ, with the upper part of the head and thorax, black, the latter having two abbreviated fulvous lines; upper wings brown, with numerous large, rounded, tawny spots in rows between the nervures; hind wings brown, with a broad, tawny, transverse band near the tip, and attaining the margin at the anal angle; base spotted with tawny yellow upon and behind the anterior edge; head beneath, with the palpi, coxæ, anterior thighs and tibiæ, and bases of the intermediate and posterior thighs, fulvous.

The two sexes of this beautiful species were presented to me by the Rev. L. W. Leonard, who took them near the Grand Monadnock Mountain in New Hampshire.

Phryganea argus Harr. MSS.

♀ *fenestrata fulvo-brunnea; antennis lineisque tribus mesothoracis nigris; alis hyalinis; anticis fusco-venosis, areolisque ovalibus fenestratis fusco-cinctis. Alarum expansio* 2 *unc.*

Body pale tawny brown. Antennæ (except the first joint) and three short dilated lines on the mesothorax, black. Wings transparent; disk of the anterior pair dusky or brownish, including several transparent whitish spots, whereof seven, in two transverse rows, are oblong oval; nervures margined with brown from the base to the fenestrated spots, entirely brown from thence to the tip; hind wings with a minute brownish carpal spot.

This is the largest native species that is known to me. It was taken in Maine by Dr. John W. Randall. It resembles *P. digitata*, as figured by Pictet.

HEMIPTERA.

Membracis ampelopsidis Harr.

Thorax variegated with ferruginous bands, carinated, and with a foliaceous, subrhomboidal crest in the middle. Feet simple. Body with large, dense punctures; front pale greenish yellow, sprinkled with brown points; thorax crested above, obtusely spined at its inferior angles, and acuminated behind, reddish ash colored; a transverse, undulated, rich brown band between the anterior angles, but not attaining the anterior margin; another of the same color commencing at the anterior edge of the crest, undulated backwards, extending up to the posterior angle of the crest, and passing obliquely down the side to the margin of the thorax behind the middle. A large, roundish, brown spot, sometimes obsolete, each side of the middle of the cristal edge, and some smaller ones between and behind the bands. Tips of the upper wings dusky, and with two fuscous spots. Abdomen yellowish or greenish in the female, black in the male, the incisures pale. Feet ferruginous, articulations pale. Dorsal crest rounded before, angulated behind, the edge slightly sinuated. The colors of the male are darker, and the bands are less distinct. Length ♀ about .40 in.; ♂ .35 in.

It is found in all its forms upon the *Cissus quinquefolia*, from the middle to end of June. The above describes the colors of the insect while living. When dead, after a time the general color is changed to a pale dirty yellow, and the brown bands fade so much as not to appear of half their true breadth. This species may possibly prove to be the *M. trilineata* Say; but I cannot identify my specimens with his description. Vide Long. Exped., App., p. 300.

Tettigonia (Iassus) rosæ Harr.

Body yellowish white, hemelytra and wings white, hyaline. Eyes, claws, and ovipositor brown. Length .18 in. ♂ and ♀ sub cop. June 15, 1846, heads opposite, bodies in one line.

Hind tibiæ angular, with an internal and external row of spines; fore tibia pectinate, with a few spines within; intermediate unarmed. Ocelli distant, inserted on the front, just below the anterior margin, between the eyes and above the antennæ. Antennæ in a little longitudinal furrow, the seta longer than the head. Head narrower and much shorter above than the thorax, somewhat inflated on the anterior edge; thorax convex before, nearly transversely incised behind, wider than long. Wing covers connivent and nearly vertical at tip. Recently transformed. The pupa skins numerous under the leaves.

This is an *Iassus*, according to the characters given by St. Fargeau and Serville, Encyclop. Méthod., Insectes, X, pp. 602 and 612, and a *Bythoscopus*, according to Germar, Rev. Entomol., I, p. 180. Anal valves of ♂ recurved. Appears to belong to Fitch's genus *Empoa.*

Aphis caryæ Harr.

Stylo nullo, corniculis brevissimis, corpore cinereo, dorso nigro-maculato; femoribus brunneis, tibiis, tarsis antennisque nigris.

Body with a cinereous pruina, which is somewhat evanescent on the thorax, so as to exhibit the black color, more or less, on this part. Dorsum of the abdomen with four longitudinal rows of transverse black spots (or four on each segment). Style obsolete; cornicula very short, tuberculiform, rostrum extending only to the middle of the third segment; wings fuliginous, bases ferruginous brown, dilated, costa and nervures black; legs black, hairy; the posterior tibiæ remarkably so; femora, except at tips, ferruginous brown. Length of body .25, of upper wings .35, of body and wings when at rest .43, expansion of wings .72 of an inch.

Larvæ, pupæ and winged insects found on the limbs of the *Carya porcina*, July 1, 1831.

Aphis salicti Harr.

Stylo nullo, corniculis brevibus fulvis, corpore nigro, immaculato, alarum venis pedibusque fulvis.

Black, immaculate; wings hyaline, the veins, the antennæ, corniculæ and legs fulvous. Body black, immaculate; first and second joints of the antennæ black, third fulvous at base, remainder fuscous; corniculæ, short, fulvous; legs fulvous, tibiæ at apex and tarsi fuscous. Length about one line. Expanse of wings above four lines.

Inhabits the willow, living on the under side of the extremities of the branches. Oct. 1, 1837.

This species cannot be identical with *A. salicis* Linn., which has the body spotted with white.

DIPTERA.

Musca harpyia Harr. Catal.

M. fronte albicante; thorace cinereo-quinquelineato; abdomine maribus melleo, basi diaphano, nigro-lineato; fœminis cinereo, nigro-trilineato; alis basi *flavescentibus. Long. corp. ♂ lin.* $2\frac{8}{4}$. *In domibus mense Augusto et Septembre longe frequentissima, parietes fenestrasque fimo aspergens, ad cibas concurrens poculaque prægustans.*

Head before with a very pale yellow or whitish silky lustre, antennal fovea and antennæ black; front slightly convex, but not prominent; eyes reddish brown; in the male more approximated than in the female, and with a linear black spot interposed; female with the spot oval. Thorax fuscous, with remote, black, curved bristles; above with five cinereous lines. Scutel cinereous, blackish at the sides, and with remote black bristles. Wings diaphanous, pale testaceous at base; nervures fuscous, Winglets and poisers white. Legs black, and with black hairs. Abdomen, in the male, honey yellow, diaphanous at base, blackish, and with long black bristles at tip; a dorsal black line and the segments slightly edged with black. Abdomen of the female cinereous, with a silky lustre, sides at the base honey yellow; a dorsal line and an interrupted one on each side, black.

This is our most common house fly, which must closely resemble the *M. domestica* of Europe. The front in the living insect cannot be said to be golden, the yellowish tinge is hardly perceptible.

Musca familiaris Harr. MSS.

M. fronte prominulo, fulvo; thorace scutelloque fulvo tomentosis; abdomine cinereo micante, tessellis marginibusque segmentorum nigro-variantibus. Tempore vernali et æstivo in parietibus hospitatur.

Head somewhat prominent in front, of a dirty yellow or tawny color with a silky lustre, and distinct black bristles; eyes in the male connivent above, in the female distant, with an interposed, oblong, black spot, furcate above and below, antennæ blackish, with the articulations piceous or ferruginous. Thorax black, covered with a close, dirty yellow or fulvous, coarse pubescence, with remote, curved, black bristles. Wings at the articulations and extreme base, ferruginous. Winglets and poisers white. Legs rusty black, with black hairs. Abdomen with distant, curved, black bristles, in both sexes cinereous, with a silky lustre, each segment with two quadrate black spots, and widely edged with black, varying in situation and degree, according to the incidence of light.

This species, not uncommon in houses in summer, nearly disappears when the more abundant *M. harpyia* prevails. It resembles *M. rudis* Fabr., but is larger than the only specimen which I have seen, and has the thorax much more densely clothed with fulvous hairs. From *M. harpyia* it differs in its superior size, in having the eyes contiguous in the male, in the prominence of the front, in the hairiness of the thorax, etc.

ARTICLES OR FRAGMENTS,

HITHERTO OBSCURE OR INACCESSIBLE, REPRINTED FROM

THE ORIGINAL DOCUMENTS.

[New England Farmer, Vol. VII, No. XII, pp. 90, 91, Oct 10, 1828.]

CONTRIBUTIONS TO ENTOMOLOGY.[1] NO. I.

An interest in the science of entomology appears to be awakened among us, and we are gradually becoming sensible of the utility of the pursuit. To mention nothing more, the frequent inquiries, made in public journals, respecting the economy and metamorphoses of insects, sufficiently indicate a desire for further information. There may be some who object to the study of insects on account of their apparent unimportance and insignificance. These may be assured that it is a never failing source of the most rational enjoyment; and that there is as much to be discovered and to astonish in magnifying an insect as a star. The powerful influence which insects are permitted to exert over our interests, compel us to notice them; and their wonderful structure, metamorphoses, and habits display the wisdom and protecting power of their Creator.

Hitherto our insects have been better known to naturalists across the Atlantic, than to ourselves. We have been too busy, too idle, or too ignorant to give the public an account of these numerous inhabitants of this new world. With here and there a solitary exception, Mr. Say is the only American naturalist who has made known to us any of these curious objects. In the following contributions will be described some of those which are to be found in this vicinity; a part of them are *supposed* to be new, and others not fully investigated. It is thought that this may be of some service to those who are commencing the study of entomology, and may stimulate them to pursue this interesting branch of natural history, and to seize every opportunity of recording the facts, which may come to their knowledge, respecting the insects they investigate. If, hereafter, it shall be shown that any of them were previously known, it will give us pleasure to acknowledge it, when duly informed. It certainly cannot be a cause for reproach that among the many rare, expensive, or inaccessible European works on Entomology, or in the very brief and unessential descriptions of others, the characters of some of these supposed new species may be detected. The number of known plants in the United States, according to Mr. Nuttall, is about 5000: Mr. Kirby states that insects are to plants as 6 to 1; according to this ratio the number of our insects must amount to 30,000. Mr. Say has described about 1200 new species, and perhaps 3 or 4 thousand may be known to Europeans: still a vast number must remain unnoticed. Shall those, then, who have studied the characters and investigated the habits of these insects in their native wilds, *delay* publishing the fruits of their labors because they may possibly, now and then, add a new synonym to nomenclature? The following appropriate quotation may well close these preliminary remarks. "This procrastination on our part, in most cases, springs from a laudable though erroneous motive. We aim at a point of perfection never to be attained. Year after year we keep back that knowledge we have already acquired, in the hopes of rendering it more perfect. New discoveries arise, yet we wait for more. Meantime the stream of life is slowly passing from us; we find those discoveries on which we had built our future fame, anticipated by contemporaries. Forcibly impressed with this conviction, I shall make no apology on this, or any future occasion for laying before the readers of this journal detached descriptions or isolated remarks on such new objects as may come before me; imperfect as these observations may be, they may stimulate the inquiries of others; and, at all events, secure to *this country*, in some measure, the credit of making known the natural productions of her own possessions."

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[1] [The text has been strictly adhered to, excepting where subsequently corrected by Dr. Harris, in the same "Contributions," or in MSS. in his own copy of the New England Farmer.]

For the characters of the families and genera, Samouelle's "Useful Compendium,"—the article "*Entomology*" in Brewster's Encyclopedia, or the 3d volume of Cuvier's "Règne Animal," may be consulted.

ORDER COLEOPTERA.

Family Cicindelidæ.

GENUS CICINDELA.

The insects of this genus frequent dry and sandy places, and some species are very common in our highways. They fly swiftly, and frequently alight at a short distance from their starting point. They are rapacious and devour such small insects as they can seize. There may often be observed small round holes in the ground frequented by Cicindelæ; these are the habitations of the larvæ.—By passing down a straw as a director, and carefully removing the earth, we can obtain the larva. It has a soft, cylindrical, whitish body, with corneous, purple or green head, thorax and jaws. There are 6 legs near the head, an anal proleg, and a pair of tubercles surmounted with hooks on the eighth segment. When in ambush it remains near the surface, the head closes the hole, and thus conceals the pit and its sanguinary inhabitant from those incautious insects which may be passing over it. These are seized in a moment and conveyed to the bottom of the retreat, to be devoured at leisure. The tubercles and hooks assist the insect in its frequent motions up and down, and the large concave surface of the head serves as a basket to hold the earth which it excavates in fabricating its burrow. The mouth of this is carefully closed with earth when the larva has attained its growth; it then becomes a pupa, and after some time emerges in its perfect state. The Rev. L. W. Leonard, of Dublin, N. H. kept one of these larva in a vessel of earth, and fed it daily with small insects, till it underwent its metamorphosis. There appear to be two broods in the year, one makes its appearance in August and September, and the other in the following April and May, having remained pupæ during the winter.

C. denticulata. Brilliant polished green; mandibles elongatêd, slender; each elytron with 3 unequal marginal spots and terminal spots and terminal lunule white.[1]

Length near half an inch.

Head green, blueish and longitudinally corrugated and in the male with long white hairs between the eyes; four basal joints of the antennæ brassy green, remaining ones piceous; labrum tridentate, with 6 marginal punctures, of the male white edged with blackish brown, of the female entirely greenish black; mandibles very long, slightly arcuated, slender, greenish black, above with a linear, basal, white spot; palpi brassy green in the male, greenish black in the female; eyes brown. Elytra brilliant æruginous green, in certain positions blue or purple, with very minute distant punctures, a series of deep punctures with elevated centres near the suture, an abbreviated series of similar punctures near the humeral angle, and a few scattered ones around the scutel: external margin with three white spots, one of which near the middle of the margin is large and triangular, the apex of the triangle pointing to the suture; one very small and rounded between the former and base of the elytron; and the third or posterior one elongated longitudinally into an oblong oval shape, not quite attaining the margin, and confluent behind with the terminal lunule. Pectus, postpectus, and thighs green, with white decumbent hairs.

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[1] *rugifrons*, Dej.

Variety *a.* Elytra purplish blue.
b. Anterior spot of the elytron wanting.
c. Anterior spot wanting, triangular [91] one reduced to a transverse line, posterior one small, not reaching the terminal lunule.
d. Two anterior spots obsolete.
e. All the spots wanting except the terminal lunule, which is merely an abbreviated transverse line.
f. Elytra immaculate.

This species is evidently distinct from the very common *C. sexguttata;* a single glance at them when compared together will convince any one of their specific difference. The long slender mandibles of the *denticulata* are remarkable, those of the 6 *guttata* being one third shorter, more robust, and more curved. The latter species has no hairs between the eyes, nor beneath the pectus and postpectus, the elytra appear rough from the deep confluent punctures with which its surface is impressed, and it is destitute of the remarkable humeral and subsutural series of deep punctures. The shape and disposition of the white spots are different in the two species, the *denticulata* never having the *supernumerary* discal spot observable in a variety of the *sexguttata.*

This fine species was captured on the sands near Sweet Auburn in Cambridge, in company with Mr. Say's splendid *C. formosa.*[1] It was sent, with the next species, to Prof. Hentz, who has adopted the specific names here given in a paper read before the Academy of Natural Sciences of Philadelphia. His descriptions have not yet met my eye.

C. hæmorrhoidalis. Brownish obscure; elytra with a humeral and terminal lunule, an intermediate sigmoid band, and two dots behind the band white; postpectus and thighs green, ventral segments sanguineous.

Length nearly half an inch.

Antennæ green at base; head cupreous, with two green abbreviated lines

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[1] *generosa,* Dej.

between the eyes;—mandibles white at base, black at the points; lip white, with a single tooth. Thorax cupreous, obscure, with the margin and breast green. Elytra obscure, somewhat cupreous; a humeral lunule apparently formed of two spots connected by a curved line, on the middle of the elytron a flexuous or s-shaped band, behind this a marginal spot, and near the middle of the tip another larger spot almost touching the anterior portion of the terminal lunule. Pectus and postpectus green, the latter with white decumbent hairs at the sides; ventral segments sanguineous. Thighs green, feet obscure.

This pretty species is found in dry paths in woods; but does not appear to be common. From what was observed under the preceding species it will be seen that these two must be called *C. denticulata*, and *hæmorrhoidalis*, Hentz.

The other insects of this genus, found in this vicinity, are *C. vulgaris*, Say; *C. purpurea*, Olivier; *C. hirticollis*, Say; *C. formosa*, Say; *C. sexguttata*, Fabricius; and *C. punctulata*, Fabricius.

[New England Farmer, Vol. VII, No. xv, pp. 117, 118, Oct. 31, 1828.]

CONTRIBUTIONS TO ENTOMOLOGY. NO. II.

Family Carabidæ.

This extensive family contains numerous species which are arranged under various genera. The perfect insects usually conceal themselves during day under stones, and fly abroad at night. Like the Cicindelæ they live by rapine, and devour such insects as they can conquer, not always sparing those of their own family. Some species are to be found in the day-time searching for their prey in highways, or on plants. Some inhabit beneath the bark of trees, and a few appear to feed on the pollen of flowers. Most of them exhale an offensive odour, which remains on the fingers a long time after handling them. Others emit from the mouth or tail a caustic acid liquor, highly volatile, and irritating to the skin. Having incautiously taken up *Carabus sylvosus* it assailed me with a sudden jet of this fluid, several drops of which reached my face, produced an acute scalding sensation, and left spots which remained inflamed for some hours. The species of the genus *Brachinus* have been long celebrated for their crepitating powers. Mr. Kirby calls them "the true counterparts of the skunk, exploding a most fetid vapor from the ordinary passage." This is the insect's mode of defence against its assailants, which it bombards with repeated discharges of smoke and noise, gun-boat like, from behind. The

American bombardiers are fully equal, in this respect, to foreign species. The Carabidæ were employed by ancient physicians as internal remedies in various diseases; their acrid qualities might render them useful as external irritants, or as substitutes for blistering flies.

But few of the larvæ are known. Their habits are predaceous; they are serviceable in destroying smaller insects and caterpillars, and do not attack or injure vegetation. They dwell in the ground, but some of the larger kinds have been found on trees, inhabiting the nests of caterpillars, and committing great havoc among them. The redoubtable enemy of the *cut-worm* appears to be one of the family.

The general shape of the larva is long, linear, flattened above, with strong curved jaws, six legs near the head, a distinct thoracic shield, and an anal proleg. They are blackish in color, and active in motion.

GENUS BRACHINUS.

*B. *medius.* Testaceous, elytra, dull reddish purple, obsoletely and broadly striated, antennæ fuscous.

Length five twentieths of an inch.

Body pale ferruginous or testaceous, with very short, decumbent, pale, ochreous hairs. Head with rugose impressions near the antennæ. Two first joints and base of the third joint of the antennæ testaceous, remaining ones fuscous. Anterior angles of the thorax obtusely rounded, disc very convex, with deep medial and submarginal impressed lines. Elytra somewhat polished, reddish purple, with six or seven obsolete and shallow striæ. Feet ferruginous, body beneath darker. It is found beneath stones, and is sufficiently distinct from others by the regularly curved anterior angles of the thorax.

*B. *minutus.* Thorax dark ferruginous, oblong-cordate, elytra blackish purple, antennæ and ventral segments fuscous.

Length one fifth of an inch.

Head, thorax, and feet dark ferruginous, almost castaneous. Antennæ fuscous, except the two basal joints which are ferruginous. Head with two longitudinal indentations between the eyes. Thorax oblong-cordate, anterior angles subacute, disc very convex, middle longitudinally impressed. Elytra blackish purple, with a greenish tinge, obsoletely striate the alternate interstitial lines more elevated than the intermediate ones. Body beneath castaneous-brown, ventral segments fuscous.

Inhabits beneath stones, but is rare. The shape of the thorax approaches to that of the *crepitans*. Our most common species is the *fumans*, F., which somewhat resembles the above in colors, but is over half an inch long.

GENUS ZUPHIUM.

*Z. *bicolor.* Pubescent, reddish-bay; coleoptra and abdomen castaneous. thorax canaliculate, elytra sulcate, antennæ compressed.

Length over eleven twentieths of an inch;—breadth of coleoptra between three and four twentieths of an inch.

Body reddish bay, with short decumbent, ferruginous pubescence. Head punctured; a lateral longitudinal impression each side near the antennæ; neck distinct, impunctured; second and third joints of the antennæ nearly equal in length, and with the first obconic; terminal joint flattened, oblong, rounded at tip; intermediate joints transverse, gradually broader to the penultimate one, and laterally compressed. Palpi with obconic joints, the terminal ones largest and truncate at tip. Thorax cordate, truncate before and behind, rather wider than long, anterior angles rounded, posterior ones slightly excurved, subacute; disc deeply and distinctly punctured, and longitudinally canaliculate. Coleoptra parallelogramical, basal and external apical angles rounded, disc chestnut colored, paler at base, widely grooved, the grooves punctured, obsolete at tip; external submargin with a few, remote, larger, ocellate punctures. Body beneath punctured, pectus postpectus and feet reddish bay, ventral segments castaneous. Tarsi with entire joints. Nails simple.

This insect must be very rare. The specimen from which this description is taken was presented me by Charles Pickering, M. D., who found it in the vicinity of Salem. Some doubts[1] existing respecting the propriety of placing it in the genus *Zuphium*, the characters of the species are detailed particularly with reference to elucidating the genus, no other species of which I have seen.

GENUS HARPALUS.[2]

*H. *sericeus.* Black, punctured, pubescent above; antennæ annulated with reddish-brown and fuscous; thoracic angles rounded; tibiæ and tarsi reddish brown.

Length of the male two-fifths of an inch, of the female rather more.

Body depressed, brownish black, opaque, with distinct large punctures, and short, decumbent, ferruginous pubescence above. Mandibles castaneous, palpi and three basal joints of the antennæ reddish bay, each of the remaining ones of the same color at the tip, and fuscous at base. Thorax distinctly margined, angles rounded, the posterior ones very obtusely; disc not much elevated, dorsal and basal lines obsolete, and in the place of the latter a broad, shallow, confluently punctured depression, uniting with the dilated lateral [118] margin. Elytral striæ impunctured, submarginal series of punctures indistinct; apex of the elytra sinuate. Body beneath and thighs black, polished; tibiæ and tarsi, reddish brown or bay.

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[1] Can it be a *Helluo*? I have not dissected the mouth, but the palpi have not the terminal joint obtriangular.

[2] *Ophonus.*

This insect is very common on grass during the warm days of summer. It somewhat resembles *H. herbivagus*, and probably also *H. faunus*, Say; but is easily recognized by being entirely punctured, and sericeous above, by its more rounded thorax, its dark thighs, and annulated antennæ.

[New England Farmer, Vol. VII, No. xvi, pp. 122, 123, Nov. 7, 1828.]

CONTRIBUTIONS TO ENTOMOLOGY. NO. III.

GENUS FERONIA.

Subgenus Omaseus.

The characters of this section of the *Feroniæ* have not yet reached us; but comparisons with several European types enable us to indicate the following species. The first, only, appears to be apterous; the remaining ones are winged; in this respect agreeing with the European specimens. All of them (both native and foreign species) have the thorax somewhat heart-shaped, truncate at apex and base, and not quite so wide as the coleoptra; the dorsal stria is distinct, and dilated near the base; disc, near the basal angles, indented, punctured, and with two abbreviated impressed lines. The third interstitial line of each elytron has, generally, three large punctures; one, near the base, contiguous to the third stria, the others contiguous to the second stria, one on the middle and the third near the apex. In a few the basal puncture is wanting. The submarginal interstitial line is serrato-punctate within, the punctures approximated near the tip, and somewhat ocellated.

[123] These species do not agree entirely with any of the descriptions of Say, though they approach to some of his *Feroniæ* in the Philadelphia Philosophical Transactions. These insects are found under stones.

*O. *bisigillatus.* Black; posterior thoracic angles rounded, each with an annulated depression.

Length eleven twentieths of an inch.

Body glabrous, black. Antennæ piceous toward the tip; palpi pale reddish brown. Thorax broadest just before the middle, lateral margin forming a regular curve, posterior narrower than the anterior margin; posterior angles not excurved, but obtusely rounded; lateral basal lines very much abbreviated, the external one obsolete, and between them is a deep, circular, punctured depression, with elevated centre. Striæ of the elytra impunctured, basal dilated interstitial puncture wanting. Tarsi pale reddish brown.

*O. *subpunctatus.* Black, glabrous; thorax broadest before the middle, and gradually narrowed to the base; striæ obsoletely punctured.

Length over half an inch.

Body glabrous, black. Antennæ entirely black except the tip of the terminal joint which is ferruginous. Palpi black. Thorax broadest considerably before the middle, behind which the lateral margin is nearly straight to the posterior angles, which are very slightly excurved and acute; posterior margin narrower than the anterior; base with the double lateral striæ distinct but short, and vanishing in a rugose punctured depression. Elytral striæ obsoletely punctured. Pectus and postpectus punctured at the sides. Feet black, tarsi tinged with piceous beneath.

*O. *politus.* Black, polished; anterior and posterior thoracic margins nearly equal, posterior angles excurved, basal indentations elongated, sparsely punctured.

Length over nine twentieths of an inch.

Body deep black, highly polished. Three basal joints of the antennæ black, polished, remaining ones fawn-colored and downy terminal joint pale ferruginous at tip. Palpi fawn-colored. Thorax broadest nearly in the middle; anterior and posterior margins almost equal, lateral margins regularly curved, at the base slightly excurved; posterior angles not prominent; basal lateral impression deep, with a few remote punctures, internal longitudinal stria elongated, dilated at base, external one obsolete. Elytra with minutely punctured striæ. Pectus and postpectus punctured, the former inconspicuously. Tibiæ and tarsi pale piceous above, fawn-colored beneath.

*O. *hamatus.* Black, polished; basal thoracic lateral lines uniting into a hook; tibiæ and tarsi fawn-colored.

Length nearly two fifths of an inch.

Body highly polished, black with violaceous reflections. Three basal joints of the antennæ castaneous, polished, remaining ones fawn-colored, terminal joint at tip ferruginous. Palpi reddish brown. Thorax of similar proportions and shape as in *O. politus;* lateral indentations of the base rough with confluent punctures, each with two impressed lines, the internal one longest, curving outward near the posterior margin, and uniting with the very short external line so as to form a hook. Elytral striæ minutely punctured. Pectus and postpectus punctured. Legs pale piceous, tibiæ and tarsi pale reddish brown or fawn-colored.

Subgenus Calathus.

In addition to the characters of the genus as given by Latreille and

Leach, it may further be distinguished from the other *Feroniæ* by its pectinated nails, and from *Lebia* and *Cymindis*, with which it agrees in this respect, by its broader subquadrate thorax. The feet are remarkably elongated, and the posterior pair are unusually remote from the intermediate ones.

*C. *piceus.* Piceous; thorax, at the sides, and body beneath paler; antennæ and feet pale testaceous.[1]

Length two fifths of an inch.

Body glabrous, polished, impunctured, above dark chestnut or piceous, beneath castaneous. Palpi and antennæ pale testaceous or ochreous. Thorax subquadrate, narrower than the coleoptra at base, the angles rounded; broad external margin reddish brown; dorsal striæ minute, basal indentations obsolete. Elytral striæ impunctured, interstitial lines flat, the submarginal serrato-punctate within, punctures ocellated; tip of the elytra entire, rounded. Sides of the body, beneath, somewhat darker than in the middle. Feet pale testaceous.

It must closely resemble the *Feronia gregaria*, Say, but differs in having a narrower thorax not pale at base, and with differently colored feet and antennæ. It has not the pale elytral margin of *F. terminata*, Say, nor the broad thorax of that species; and varies from *F. autumnalis*, Say, in many respects, besides being much larger, and having the tips of the elytra not sinuated. Sent by Rev. L. W. Leonard, from Dublin, N. H.

[New England Farmer, Vol. VII, No. XVII, p. 132, Nov. 14, 1828.]

CONTRIBUTIONS TO ENTOMOLOGY. NO. IV.

Subgenus Anchomenus.

United to *Callistus* by Latreille, who informs us that it is distinguished from *Agonum* by having the thorax heart-shaped and truncated at base and apex. Leach says that the characteristics of this genus of Bonelli are, to have the third and fourth joints of the palpi equal, sub-acute; the basal thoracic angles acute; and (in which it differs from *Callistus*) in having the thorax glabrous, the labrum transversely quadrate, entire, and the body somewhat depressed.

Our species exhibits the above characters, on which I must depend for the propriety of arranging it in the genus, no foreign types of which I have seen. Congeneric is *Feronia decora*, Say, and probably also the species named by him, *F. cincticollis* and *decentis*. The *decora* is about the size of the following, has a rufous thorax and dark cupreous elytra. They are found under stones in wet meadows.

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[1] *C. gregarius.*

A. extensicollis. Head and thorax green, elytra purple, margined with green; beneath piceous; feet ochreous.

Length seven twentieths of an inch.

Head impunctured, and, with the thorax, æruginous green; lip and mandibles piceous, palpi and antennæ dark reddish brown, basal joint of the latter ochreous. Thorax at base and dilated lateral indentations slightly punctured, dorsal furrow distinct. Scutel blackish purple. Elytra deep reddish purple, external submargin green, with twelve or more ocellated punctures; striæ distinctly punctured at base, interstitial lines very slightly convex, with exceedingly minute punctures, the third line with from five to seven large punctures, three of which nearest the base are contiguous to the third striæ, the fourth in the middle of the interstitial line, and the remaining ones contiguous to the second stria. Body beneath glabrous, piceous; feet ochreous.

The punctures of the interstitial lines are so small as not to be discovered except by a powerful magnifier. It is probable that this insect is the *Feronia extensicollis* of Say, with whose description it agrees in most respects, and therefore his name is adopted, until a comparison with an undoubted specimen of his insect shows mine to be distinct, in which case it may receive the specific appellation of *proximus*. Mr. Say describes the *extensicollis* as having impunctured striæ, convex interstitial lines, rufous antennæ and palpi, and testaceous feet, in which it differs from our species.

GENUS CHLÆNIUS.

*C. *pubescens.* Head and thorax green, elytra olivaceous, head impunctured, labrum truncate, body beneath fuscous, feet pale ochreous.

Length nearly nine twentieths of an inch.

Body pubescent, the hairs decumbent, sericeous, ferruginous. Head bald, glabrous, impunctured. Palpi and three basal joints of the antennæ ochreous yellow, smooth; remaining joints fuscous, very hairy. Labrum and mandibles castaneous. Thorax above green, polished, punctured, with longer, more elevated hairs than on the elytra; broadest in the middle: longitudinal and transverse diameters subequal; lateral edges purple, regularly curved, slightly excurved at base; disc distinctly canaliculate, basal lines tinged with purple, elongated, and curving outwards towards the middle of the margin. Coleoptra olivaceous, disc purplish, submargin green, outer edge dark ferruginous; surface slightly polished, deeply and distinctly punctured; punctures of the striæ approximated, less distinct at tip; interstitial lines a little convex. Pectus, postpectus and vent fusco-piceous, punctured, with remote hairs. Feet pale ochreous yellow.

Apparently approaches very near to C. *Pennsylvanicus*, Melsheimer; but differs from Mr. Say's description of that species in being pubescent, in the paler color of the base of the antennæ and feet, and in the differently colored elytra, and truncate labrum, the punctures of the striæ, altho' less distinct, are by no means obsolete at tip. Found under stones in wet places.

GENUS DICÆLUS.

*D. *Leonardii.* Reddish black, polished; body, beneath, feet, and palpi piceous; antennæ fawn-colored.

Length half an inch.

Body glabrous, polished, impunctured, above deep piceous or reddish black, beneath paler. Mandibles and labrum black, palpi piceous at base, paler at tip. Three basal joints of the antennæ piceous glabrous, remaining ones covered with fawn-colored pubescence. Thorax quadrate, diameters equal, not contracted before; anterior angles simply rounded; somewhat contracted behind the middle, and rectangular at base, where it nearly equals the coleoptra in breadth; lateral edge not reflected; dorsal and lateral lines deep; anterior part of the disc with a small foveolus, each side of the dorsal line, and having a fortuitous appearance. Elytral striæ impunctured; interstitial lines very convex, submarginal one serrato-punctate within. Feet piceous, tarsi paler above, and almost fawn-colored beneath.

The filiform antennæ will prevent this insect from being mistaken for *Abax coracinus*, Say, to which it appears to have some resemblance. The latter insect is known to me only by description.

This fine *Dicælus* was sent to me from Dublin, N. H. by the Rev. L. W. Leonard, whose kindness I am happy to acknowledge by the name. Two other species of the genus are found in this vicinity, namely, *D. dilatatus*, Say, and *D. elongatus*, Bonelli. They are found under stones, but are rare.

[New England Farmer, Vol. VII, No. xx, p. 156, Dec. 5, 1828.]

CONTRIBUTIONS TO ENTOMOLOGY. NO. V.

Family Dytiscidæ.

In order to distinguish our friends from our enemies, insects decidedly injurious from those that are beneficial to mankind, we must study the history of all which may be observed, whether inhabitants of the air, the earth, or the water. The insects of this family pass the first and last stages of their existence in lakes, ponds and pools. They are among those that make reparation for the injuries they commit in some respects, by keeping within bounds other annoying insects. In the larva and perfect states they are predaceous, sanguinary, and carnivorous. Their food is aquatic animals, such as the young fry of fish, tadpoles, some of the mollusca, crustacea, and worms, and the larvæ of dragon-flies, gnats, and mosquitoes: and in their turn they serve as nourishment to fishes, &c. The larvæ live in the water only, the pupæ are terrestrial, and the perfect insects amphibious. I have repeatedly found the latter remote from water, where they had transported themselves by flight. It is at night that they usually ascend into the air, to exercise their ample wings, or to seek for a better supply of food in more distant waters. They sometimes enter our windows in the evening, being attracted by the lights. The perfect insect swims with celerity by means of its feet, particularly the hind ones which are flattened and densely fringed with hairs: it rises from the bottom without effort in consequence of being rather lighter than the water.

The respiration of these insects is worth examination. In terrestrial animals of the higher classes air is inhaled through the throat into the lungs, where it produces an essential and vital change upon the blood. In fishes the same effect is produced by the water, which always contains a large proportion of air mixed with it, and which, entering by the mouth, passes out again at the gills, a kind of lungs. Other aquatic animals have these gills, or branchiæ as they are called, outside of the body, and hence constantly bathed in water, and exposed to the action of the air that it contains. Some aquatic larvæ of insects have similar respiratory branchiæ, and these are the only ones to which pure or unmixed air is not necessary. The majority of insects, in all stages, breathe *air* through lateral pores or spiracles, none receive it through the mouth, and the lungs are replaced by longitudinal tubes, their numerous minute branches, and air vesicles. The spiracles of insects, which open directly into the longitudinal tubes, are from two to eighteen in number: through the posterior or anal and abdominal ones the air is admitted or inspired, and it is expelled or expired through the anterior ones or those of the trunk. The *Dytisci*, in the perfect state, have eighteen spiracles, the abdominal pairs are situated upon the dorsum, and are covered by the elytra. When it becomes necessary for the insect to take breath it ascends to the surface of the water, reversed, the under side of the tail being uppermost, and the body kept steady by means of the long oar-like hind legs, which are extended at a right angle with the trunk. The abdomen is then slightly curved so as to separate it from the elytra, and elevate it above the water, the air easily insinuates itself into the cavity thus formed, and is inhaled at the pores, the last pairs of which are larger than the rest to admit it in this position with greater freedom. When inspiration is completed the elytra are quickly closed upon the body, and the entrance of water effectually prevented. This motion is sometimes so sudden as to retain, between the body and elytra, a small quantity of unimbibed air, which makes its way under the tips of the latter, where, as the insects sinks, it adheres, a transparent globule, brilliant as quicksilver. The upper surface of the body being arched or convex, and its under side braced by a breastbone of several pieces firmly interlocked, it is rendered sufficiently strong and inflexible; while its oblong oval form and thin margins are well adapted for its rapid and varied motions.

Although insects have no organs of *voice* most of them emit various sounds; and those of this family, in common with many others, exhibit their distress on being handled by a creaking sound produced by the friction of the tail against the elytra.

They pass the winter in the perfect state, burrowing in the banks and mud of their pools.

One has been kept for three years and a half in perfect health, in a glass vessel filled with water, and supported by morsels of raw meat. It was capable of fasting a month; was very sensible of the changes of the weather, which it indicated by the height at which it remained in the vessel.

DeGeer fed one upon flies and spiders, and, after it had lived a long time, he gave it a large leech which it attacked and devoured; but it paid dear for its gluttony; the food proving indigestible was thrown up the next day with great efforts, and shortly afterwards the insect died.

GENUS DYTISCUS.

*D. *fraternus.* Punctured; beneath black; thorax with a yellowish band and margin; coleoptra arcuato-fasciate behind; elytra of the female sulcated.

Length about eleven twentieths, breadth between six and seven twentieths of an inch.

Body depressed, with numerous somewhat dilated punctures. Head pale rufous, black at base, with two lunated piceous spots between the eyes. Thorax with an ochreous yellow margin, and transverse band, which is dilated backwards at the sides, and separated from the posterior margin by an obsolete blackish line. Scutel impunctured, black. Coleoptra blackish from numerous confluent, black spots and flexuous lines; epipleura, external margin, subsutural line, common arcuated band behind the middle, and obsolete macula at tip pale ochreous yellow. (Male with four obsolete elevated lines on each elytron.) Prosternum and anterior legs pale ochreous; hind legs piceous, thighs black. Ventral segments with a pale piceous submargin, and, on each side, a yellowish spot.

Female. Coleoptra with eight, dilated, hairy grooves; (not including the external, depressed submargin which is not, properly, a groove;) hairs depressed. The external groove commences at about one quarter of the length of the elytron from the base, the next to it is considerably longer, the third from the margin is shorter than the second, but longer than the first, and the submarginal groove is shortest of all.

I have not the least doubt that this is the female of the above male, which most closely resembles *D. mediatus* of Mr. Say. In the latter, of which I have seen the sexes, the body is rather less obtuse in front, and the elytra of the female are not sulcated, but plain like those of the male; and probably belongs to *Hydaticus* of Leach.

The *fraternus* is entirely distinct from the *sulcatus* of Europe, and with it, belongs to the subgenus *Acilius* of Leach. It is described from nine specimens of the male, and six of the female.

*D. *fascicollis.* Convex, impunctured, pale testaceous; vertical lunule and base of the head, anterior and posterior thoracic fasciæ black; elytra blackish, irrorate with distinct pale yellow dots, the external margin and an abbreviated subsutural line yellowish; a distinct dorsal series, and three others obsolete of impressed setiferous punctures. Thorax of the female obsoletely corrugated each side; elytra smooth.

Length eleven twentieths, breadth over six twentieths of an inch.

Variety. Body beneath and feet pale piceous.

Specimens seven. Is probably referrible to *Hydaticus.*

*D. *thoracicus.* Pale rufo-testaceous, impunctured, oval, and somewhat convex; head and thorax immaculate; external margin of the elytra pale testaceous, disc blackish with confluent, black tortuous lines; three dorsal series of punctures. Female with obsolete rugæ on sides of the thorax; elytra smooth.

Length nine twentieths, breadth nearly three tenths of an inch.

Specimens seven. Appears to belong to *Hydaticus.*

[New England Farmer, Vol. VII, No. xxi, p. 164, Dec. 12, 1828.]

CONTRIBUTIONS TO ENTOMOLOGY. NO. VI.

Family Dytiscidæ, [Concluded.]

The Dytisci are said to deposite their eggs in the bodies of dead aquatic animals. Roesel states that they are hatched in ten or twelve days; the larva comes to its growth the same season, when it leaves the water, and forms for itself an oval cavity in the earth; in this it remains about fifteen days before it becomes a pupa, and in fifteen or twenty days more it is changed to a perfect insect.

The larva is elongated, convex, thick or swelled in the middle and tapering towards the extremities; it is of a brownish color above, and whitish beneath. The neck is distinct, the head large, with a pair of powerful curved jaws, that are adapted for suction, being hollow within, and perforated near the tips with an oblong slit. Like most other larvæ, it is furnished with several small eyes, five or six in number on each side of the head. To each of the three first segments nearest the head is attached a pair of slender legs, finely fringed with hairs. There are six spiracles on each side of the body, for the purpose of expiration. The last segment is conical, the sides fringed with hairs, which give it the power of a fin, it is terminated at tip with two conical prominences, each perforated with a spiracle, through which the air is admitted in inspiration. Beneath the tip, and forming an angle with the body are two movable, slender and short, conical filaments. These caudal processes serve to suspend the larva at the surface of the water, and retain the end of the tail above it, so that the air may enter the anal spiracles when the insect wishes to inhale it. They are called natatory laminæ by Mr. Kirby, and are supposed by him to be employed as oars in swimming; this, however, appears to be principally performed by the vermicular motion of the tail.

Several accounts are given of the voracity of these larvæ. Some of the large species attain to two and a half inches in length, and are said to attack and destroy fishes much their superiors in size. Having fixed their strong curved jaws in their prey they suck their juices through these perforated organs, and afterwards devour their solid parts piecemeal.

Beside those described here, several other Dytisci are found in this vicinity; namely, *Dytiscus verticalis*, Say, and another equally large species; *Dytiscus liberus*, *Colymbetes venustus*, *C. fenestralis*, *C. obtusatus*, *Laccophilus maculosus*, *Haliplus* 12-*punctatus*, of Mr. Say; and various other species at present undetermined.

If among the insects which we have already or may hereafter publish as new there are any which have been previously described;—those who are competent to decide are most respectfully requested to communicate personally with us on the subject, and their information will be duly and thankfully acknowledged.

GENUS COLYMBETES.

*C. *suturellus.* Beneath black; head and thorax pale testaceous, the former with two triangular spots between the eyes, the latter with an oblong apical and basal spot black; elytra with about four series of punctures, pale ochreous, and (except the margins and suture) with numerous confluent tortuous lines and spots black; pectus pale ochreous; feet pale piceous.

Length between eight and nine twentieths of an inch.

Specimens nine. Extremely like *C. collaris*, Gyllenhall, and may prove to be a variety of that European species, from which it differs, principally, in being much darker beneath, paler above, and of rather larger size.

*C. *binotatus.* Beneath blackish, ventral segments piceous at tip; head and thorax ochreous, the former with two triangular spots between the eyes, the latter with two central subquadrate spots black: each elytron with four series of punctures, a pale suture and margin, the disc irrorate with black dots and tortuous lines; three longitudinal series of spots, and a broad fascia behind the middle, obsolete, black.

Length nine twentieths of an inch.

Specimens three. It is possible that this may be the *irroratus* of Fabricius.

*C. *tæniolatus.* Ferruginous; head at base and a vertical spot black; thorax greenish black at base and tip, the black portions dilated and confluent in the middle; elytra greenish black, each with about eight irregular series of deep punctures; external margin, interrupted basal fascia, and three narrow lines pale testaceous: all beneath ferruginous. Length thirteen fortieths, breadth between six and seven fortieths of an inch.

Sufficiently distinct from *C. venustus*, Say, and *Dytiscus interrogatus* of Fabricius. Specimens six.

*C. *discolor.* Black, minutely and obsoletely granulated. Head with two basal piceous spots; elytra fuscous, margin and base pale, epipleura yellowish; three series of setiferous punctures, which are obsolete behind, on each elytron: ventral segments at tip and feet piceous: nails alike in both sexes.

Length over three tenths of an inch.

Specimens five. Appears to differ from all of the species described by Mr. Say.

*C. *acuductus.* Oblong oval, black, minutely acuducted; head before, two vertical spots, lateral margins of the thorax, and humerus piceous; pectus and feet ferruginous.

Length over five twentieths of an inch.

One individual in the collection of Mr. Oakes. Easily recognised by the numerous short scratches or acuducted impressions.

GENUS HYDROPORUS.

*H. *fasciatus.* Ferruginous, body minutely punctured above, with depressed hairs: antennæ blackish at tip; head with a dilated oblique indentation each side in front of the eyes, and a vertical blackish spot; thorax black at tip and base; elytra black, an abbreviated sometimes interrupted fascia near the base, another trimacular behind the middle, and an apical macula ferruginous: postpectus and abdomen at base blackish, punctures dilated, distinct.

Length over three twentieths of an inch.

Four specimens.

GENUS HYPHIDRUS.

*H. *punctatus.* Distinctly and regularly punctured, dull testaceous; head with two dilated frontal impressions; thorax blackish at tip and base; coleoptra fuscous on the disc, with about four obsolete paler maculæ on each elytron.

Length over one tenth of an inch.

Specimens twelve. This insect must closely resemble *Laccophilus punctatus*, Say, but cannot belong to that genus.

GENUS HALIPLUS.

*H. *immaculicollis.* Pale ochreous yellow; head and thorax immaculate; each elytron with a dilated basal spot, tip, and suture near it, three submarginal, and two subsutural spots black: The anterior subsutural spot dilated and confluent with the corresponding one on the other elytron: striæ with large black punctures.

Length one tenth of an inch.

Variety. Elytra pale yellow, basal spot wanting, central common spot of the coleoptra dilated, triangular, the others less distinct.

Specimens twenty; and of the variety three. Cannot be mistaken for the 12-*punctatus* and *triopsis*, Say, the former of which is common here.

[New England Farmer, Vol. VIII, No. I, p. 1, July 24, 1829.]

CORRECTIONS AND ADDITIONS FOR THE "CONTRIBUTIONS TO ENTOMOLOGY."

When the first number of the contributions was published, it was stated that should any of the supposed new insects prove to have been previously described, it would give me pleasure to acknowledge it when duly informed. About the last of April I obtained two volumes of the "Species général des Coléoptères" of Count Dejean. Although this work was commenced in 1825, only the first and second volumes have yet reached this country. They contain ample descriptions of many North American insects; and in them we are anticipated in several of our supposed nondescripts, besides the two following which have been published in the Farmer.

Zuphium? bicolor, N. E. F. vol. vii. p. 117, is the *Helluo præustus*, Dejean; and *Dicælus Leonardii*, ibid, p. 132, is *D. politus*, Dejean.

Through inadvertence the description of *Dytiscus thoracicus*, (N. E. F. p. 156) was offered for publication; it is identical with *D. liberus* of Prof. Say, who described it in the Journal Acad. Nat. Sciences, in 1825, from specimens sent him by me. The following should have occupied its place in the Farmer.

*Dytiscus *basillaris.* Black, levigated, impunctured; dilated frontal spot and transverse vertical line on the head, lateral margins and transverse narrow fascia of the thorax, humerus, obsolete external margin and interrupted basal fascia of the elytra, yellowish. Palpi and four anterior feet pale ochreous yellow; hinder pair piceous, thighs paler. Elytra with three series of punctures, external one faintly impressed, sutural series none.

Length two-fifths, breadth a little more than one-fifth of an inch.

Specimen a male in the cabinet of W. Oakes, Esq.

The following supposed new species of *Colymbetes*, for which I am indebted to Mr. Oakes, was captured by him in Ipswich, in November 1828, and was received too late for description in the sixth number of the Contributions.

*Colymbetes *sculptilis.* Black, acuducted; head, before, and external margins of the elytra yellow; a transverse, ferruginous, vertical spot; thorax yellow with black spots; elytra transversely striated; feet ferruginous.

Length eleven-twentieths, breadth over three-tenths of an inch. Body black, elliptical. Head with minute, short, irregular, acuducted lines, black; nasus ochreous; a transverse, ferruginous, vertical spot, and an oblong indentation near each eye. Thorax, with rivose impressed lines, ochreous; two confluent, transverse, central spots, a lunated oblique one on each side, and two linear ones, sometimes interrupted into four, near the base, all black. Elytra polished, transversely and regularly striated or acuducted; a subsutural, two central, and a submarginal dilated series of punctures; external margin and epipleura ochreous.—Body, beneath, with abbreviated, irregular, transverse, acuducted lines, black, ventral segments piceous at tip. Feet dark ferruginous.

This species is of much more attenuated and elongated form than *Dytiscus fuscus* and *striatus*, F. to both which European species it is closely allied. The anterior orbitar process, which projects over the eye in front, is very conspicuous in this species, and we find it more or less so in every one of the genus, for the determination of which it is an excellent auxiliary character.

[The remaining corrections have been inserted in the text.]

[New England Farmer, Vol. VIII, No. 1, pp. 2, 3, July 24, 1829.]

CONTRIBUTIONS TO ENTOMOLOGY. NO. VII.

Family Buprestidæ.

The species of the principal genus, which gives name to this family, are quite numerous, and many of them, in their perfect state, are ornamented with brilliant or metallic hues. The larvæ are wood-eaters or borers, and are to be classed among the noxious insects. Our forests and orchards are more or less subject to their attacks, especially after the trees have passed their prime.—The Buprestes do not leave the trees till they have completed their metamorphoses, and assumed the perfect state. The larvæ that are known to me have a close resemblance to each other; a general idea of them can be formed from a description of that which attacks the pig nut tree. It is of a yellowish white color, elongated and depressed in form, and abruptly dilated near the anterior extremity. The head is brownish, small, and merged in the next segment; the jaws (mandibles) tridentate at the points, and of a black color; the antennæ very short, tuberculiform.—The segment which receives the head (collar) is very short and transverse; next to it is a large, oval segment, broader than long, depressed or flattened above and beneath; it forms the thoracic portion of the body. Behind this the segments are very much narrowed, and, from transverse, become gradually quadrate, but are still flattened, to the last, which is terminated by a rounded tubercle. There are no legs, nor any apparatus which can serve as such, except two small tubercles on the under side of the second segment from the thorax. The motion of the larvæ appears to be effected by the alternate contractions and elongations of the segments, aided perhaps by the tubercular extremity of the body, and by seizing hold, with the mandibles, upon the sides of its burrow.

The larvæ of the Buprestes are found under the bark and in the solid wood of trees, and sometimes in great numbers. A transverse section of one of their burrows is oval, as is also the hole through which the perfect insect makes its escape from the tree. On the trunks and limbs of trees we find Buprestes in their perfect state. They walk slowly, and, at the approach of danger, draw their feet close, and fall from their situation. Their flight is swift, and attended with a whizzing noise.

I am not acquainted with the larvæ of *Trachys*, a genus separated from Buprestis, and distinguished by its short dilated, or triangular body. The habit of the perfect insect is the same as that of the cylindrical Buprestes, (*Teres*,) both being found upon the leaves of trees.

Two species of *Trachys* are common here upon the leaves of the oak, in June and July.—The largest, *T. tessellata*, F. is twenty-two hundredths of an inch in length, and has the elytra covered with whitish hairs except where they are crossed by two transverse, broad, glabrous, black bands. The other species is rather smaller, the head and thorax cupreous, or brassy, the elytra black with a sanguineous spot near the apex.—The name of this species I have not been able to determine.

Note. For the sake of exactness and brevity the dimensions of insects will be expressed, decimally, in hundredths of an inch.

GENUS BUPRESTIS.

§ I. *Scutellum none; thorax transversely truncated behind; body subconical; head nutant.*

B. **Geranii.* Body black, brassy, hairy; each elytron with eight, small subequal yellow spots in a double series, the two posterior spots sometimes coalescing into a single oblique one.

Length .25, breadth .08 inch.

In the perfect state found only on the blossoms of *Geranium maculatum*, in the stalks or roots of which I suppose the larvæ to reside.

§ II. *Scutellum distinct but minute and suborbicular; body oblong-ovate, depressed; elytra not produced at tips.*

B. Virginiensis. (Herbst.) Body black, brassy, or cupreous, beneath punctured hairy, above rugose; head sulcated; thorax with three elevated lines and two tubercles, on each side, glabrous black; elytra with the suture, a submarginal and subsutural elevated line, and four intermediate abbreviated lines black, glabrous; external edge near the apex serrate.

Length from .81 to .87 inch; breadth from .29 to .31 inch.

This is probably our largest species. The larva inhabits the trunks of the *Pinus rigida* or pitch pine, and perhaps other trees. The perfect insect may be found on the trunks of these trees in May and June. It varies in being either cupreous, brassy, or black with hardly any metallic reflections.

§ III. *Scutellum very small, subtransverse; body long subovate-triangular; elytra produced at tips.*

B. divaricata. (Say.) Cupreous, confluently punctured, thorax canaliculate, indented before the scutel; elytra striated, and with elevated blackish, abbreviated lines, tips attenuated, divergent, truncate: pectus, postpectus, and first ventral segment canaliculate. Intermediate tibiæ of the male toothed beneath the middle.

Length from .69 to .88, breadth from .24 to .30 inch.

The larva is exceedingly injurious to the *Prunus virginiensis*, or wild cherry tree, and sometimes attacks the peach tree. The perfect insect may be found on the limbs of these trees in June, July, and August.

B. obscura? (F.) Obscure brassy above, shining cupreous beneath; confluently punctured; thorax obsoletely canaliculate, indented before the scutel; elytra obsoletely striated, and with elevated, blackish, abbreviated lines; tips bidentate; not so much elongated as in the *divaricata:* pectus, postpectus, and first ventral segment canaliculate. In some lights the elytra appear to be tessellated with black and cinereous, which arises from the interstitial lines being interrupted into blackish, glabrous, elongated tubercles by intermediate patches of confluent punctures.

Length from .57 to .66, breadth from .20 to .24 inch.

It is found in the summer months on the trunks and limbs of the *Carya porcina*, or pig nut tree, in which the larva also resides.

§ V. *Scutellum minute, transverse; thorax bisinuate behind; bases of thorax and elytra subequal; shoulders prominent.*

*B. *fulvo-guttata.* Body nearly oval, depressed, black brassy and confluently punctured above, shining brassy, minutely punctured beneath; scutellar lobe of the thorax deeply indented, disc obsoletely canaliculate before, and with a small indentation each side of the middle; each elytron with two basal indentations, a pale fulvous spot on the middle near the suture, another behind the middle near the margin, and a third near the apex, in a line with the first; tip rounded; postpectus in the middle canaliculate.

Length .29 to .40, breadth .12 to .17 inch.

I captured the perfect insect on the trunk of the *Pinus strobus*, white pine, in which the larva had resided. Specimens were presented me by Mr. Leonard, of Dublin, N. H.

§ VI. *Scutellum moderate, triangular; thorax bisinuate behind for the reception of the middle of the elytral bases; coleoptra broader than thorax; shoulders obtusely rounded; anterior femora dentate.*

B. femorata. (F.) Above brassy or greenish black, confluently or regularly punctured; face plane, with two metallic, impunctured, raised spots between the eyes; thorax canaliculate, and with an obsolete impression each side; elytra with several, impressed, metallic or greenish, confluently punctured spaces, between which are some elevated, sub-glabrous, blackish lines; tips rounded, external edge very minutely serrated: Beneath brassy, sometimes tinged with cupreous, distinctly punctured, not canaliculate except on the middle of the postpectus. Two confluent impressed spots on the middle, and two larger behind the middle of the elytron are more apparent than the others.

Length .43 to .54, breadth .15 to .19 inch.

I have repeatedly taken this insect upon and under the bark of the peach tree; it is most abundant on fallen trunks of the *Quercus alba*, or white oak in June and July.

B. characteristica? (Melsheimer.) Above cupreous black or purplish brown, confluently punctured; face divided by a transverse line between the eyes, the superior portion apparently overlapping the inferior; metallic raised spots very small or obsolete; thorax and elytra with several large impressed, densely punctured spaces, between which are elevated, glabrous, abbreviated lines; tip rounded, distinctly serrated: Beneath distinctly punctured, cupreous or brassy, obsoletely canaliculate. It is rather more depressed than the *femorata.*

Length .50 to .56, breadth .18 to .22 inch.

Inhabits the white oak, upon which the perfect insect is taken in June and July.

Allied to the two last, and belonging to the same division, is a splendid little green species, .31 to .33 inch long, and .14 to .15 inch broad, which has been described, by Prof. Hentz, by the name of *B. Harrisii.* The head, thighs, and margins of the pectus and thorax in the male are of a brilliant cupreous color. The larva inhabits the small limbs of the white pine, *Pinus strobus*, on which I have captured the sexes about the middle of June.

Several small *Buprestes*, of an elongated and cylindrical form, with the scutellum divided by a transverse line into two portions, are found upon the leaves of trees. Not having ascertained the habits of the larvæ no descriptions of the species are offered. The largest native one, of this division, in my collection, is the *granulata* of Prof. Say; next to which in succession are *B. ignara*, *ruficollis*, *innuba*, F., &c. &c. These insects [3] should form a subgenus, which might be named, from their form, *Teres.*

Among about thirty American *Buprestes* in my cabinet I cannot, with certainty, identify the *lurida* of Fabricius, and have not the *Americana* and *Baltimorensis*, Herbst, *rufipes*, *quercata*, and *capitata*, F. *punctulata* Schönherr, *Trachys ? cruenta* Olivier, nor the Fabrician American species of the same genus except the *tessellata.* Any of these would be acceptable, or other insects would be given in exchange.

[New England Farmer, Vol. V, No. v, p. 33, August 25, 1826.]

Ægeria persicæ.

♂. Wings transparent, margin and nervures dark blue; body steel blue; tail bearded, the beard tipped with white; legs blue, with the joints golden yellow.

♀. Steel blue; anterior wings opaque, posterior ones, except the margins and nervures, transparent; body with a saffron-coloured band across the middle. Length of the body about 3 quarters of an inch. The female is much more robust than the male.

[New England Farmer, Vol. V, No. XXVII, p. 211, Jan. 26, 1827.]

Tremex Columba.

♂. Ferruginous, abdomen paler at the sides, posterior legs dilated, blackish.

Antennæ black, ferruginous at base and tip; wings piceous, nervures blackish; head and thorax as in the female; abdomen flattened, gradually broader at the end, and terminated by a short, serrated, blunt spine, which is black at tip; thighs blackish; four anterior tibiæ and three first joints of the tarsi black at tips; posterior tibiæ and two first joints of the tarsi dilated, flattened, black, except the superior third of the tibiæ; last joint of the tarsus ferruginous. Length of the body rather more than one inch and one fifth. The female varies in size; the largest being about one and a half inch in length, exclusive of the ovipositor, and the wings expanding over two inches and one fourth. The eggs are elongated, oval, pointed at the extremity, and less than one twentieth of an inch long; they are deposited during the month of September.

[New England Farmer, Vol. VII, No. v, p. 33, Aug. 22, 1828.]

Ægeria Cucurbitæ.

Body tawny, with four or five black dorsal spots; anterior wings olivaceous brown; posterior wings, except the margin and nervures, hyaline; tibiæ and tarsi of the hind legs densely fringed with fulvous and black hairs. Length of the body half of an inch. The wings expand one inch and one quarter.

[New England Farmer, Vol. VII, No. v, p. 34, Aug. 22, 1828.]

Arctia textor.

Body and wings white, immaculate; anterior thighs tawny; feet blackish above. Length of the body rather over half an inch, expansion of the wings one inch and two fifths.

The full grown caterpillar is about one inch and one eighth long, and is of a yellowish color, the back covered with contiguous black spots and a double series of small black tubercles, and the sides with several rust colored tubercles. From the tubercles proceed thin bunches of diverging, slender, whitish, bearded hairs, intermingled with a few black ones.—The head and feet are black.

[New England Farmer, Vol. VII, No. LI, p. 402, July 10, 1829.]

Pontia Oleracea. [Pl. IV, figs. 9–11.]

Specific character. Wings white, sub-diaphanous, anterior ones dusky at base, and on the external edge, tip beneath pale yellow with fuscous veins: Posterior wings beneath straw colored with fuscous veins, humeral angle yellow. Body black, with cinereous hairs above, and whitish ones beneath. Antennæ black brown, annulated with white scales; apex pale ochreous.

Expansion of the wings about two inches.

Egg pyriform, longitudinally ribbed, yellowish.

Larva pale green, with a darker dorsal line, very minutely punctured with darker spots, and inconspicuously downy.

Length, at full size, one and one fourth inch.

Pupa pale green or white, regularly and finely spotted with black: anterior extremity produced, conical, back before, with an elevated, laterally compressed, securiform process, sides of the dorsum, in the middle, angular, and elevated; posterior part with a central carina. Length eight tenths of an inch.

Habitat (natural unknown;) on the leaves of *Brassica Rapa*, *B. Oleracea*, and *Raphananus sativus*, in New Hampshire and Massachusetts.

[New England Farmer, Vol. IX, No. I, p. 2, July 23, 1830.]

Ichneumon Hordei.

Black, slightly hairy; head and thorax granulated, abdomen smooth, polished; thighs at tip, legs and feet at base pale ochreous yellow. Length about twelve hundredths of an inch.

[New England Farmer, Vol. IX, No. I, p. 2, July 23, 1830.]

Ægeria Pyri.

Body black, with a bluish gloss; palpi, breast, fore legs, intermediate and posterior thighs and feet, (except at tip,) and three narrow bands across the abdomen pale golden yellow. Wings transparent in the middle; the nervures, margins, together with the broad tip and small transverse somewhat triangular band on the anterior ones, covered with opaque brownish scales and hairs. A small metallic spot on the transverse band near the posterior margin, and the tip exhibiting some metallic reflections.—Length three tenths of an inch.

[Massachusetts Ploughman, Vol. III, No. XLII, July 20, 1844, with woodcuts.]

[Smynthurus cucumeris Harr. MSS.]

The creature is about as large as the black dot between the two figures. His body is plump and egg-shaped, and his head has the form of a heart. He has two horns or antennæ which are jointed and movable, and are elbowed near the middle. On each side of his head there are eight eyes, very small, and clustered closely together, so as to appear as one. His legs are six in number, and end with little claws. He cannot run very fast, but as you have seen, he can leap with surprising agility, and to a great distance. If you want to know by what means he jumps, you must examine the lower side of his body, as shown in the second figure; you will there find a forked spring bent under the body and reaching to the joints of the fore legs. Each tine of this spring fork is jointed, and the whole instrument can be turned backwards and forwards in an instant. Should he chance to alight on the edge of a leaf, and find it difficult to hold on with his feet, he throws out, from a kind of teat in the middle of his breast, a couple of grappling cords, smeared with adhesive slime, by which he secures himself from falling. The form of the cucumber skipper remains the same at all ages. His color when young is brown, and gradually changes to brownish black. Short and very fine hairs are scattered over the surface of his body, and give it somewhat of a gloss. His mouth and his teeth are very small; but he contrives to nibble, and probably also to suck the seed leaves of the cucumber so as to make them wither and die. Of his further history nothing is known to me. It may be that he lives only one summer, and that his mate leaves her eggs in the ground to be hatched and bring out a new brood of skippers the following spring. The scientific name of this little animal is *Symnthurus*, but whether he be the species called *altra* by Linnæus, or should turn out to be different thereform, I know not.

[The following passages in the first edition of the State Report on Insects were not included in the third edition; the number at the commencement of each extract refers to the page of the first edition from which it has been taken.]

[Note to Melolontha variolosa, p. 33 of 3d Ed.]

[30.] In my prize essay, before alluded to, I proposed to restrict the genus *Melolontha* to those species that have more than three leaves in the knob of the antennæ, as in the *variolosa*, and the European *Scarabæus Melolontha* of Linnæus. This has actually been done by Latreille, but probably without being aware of my suggestion. It would have been better, however, to have given this genus some other name, instead of *Melolontha*, because this was first used by Linnæus as a specific name, which, according to the well known rule of priority, cannot be discontinued in its original application, without manifest injustice to the first describer. To continue the comparison made, on another page, between the names used in natural history and those of persons,—insects, like ladies, may and do, frequently and repeatedly, change their generical or family names; but there is no good or commendable authority for depriving either of them of their specific or baptismal names. I therefore propose to restore to the *Melolontha* of the ancients and of Linnæus, its original distinctive or specific appellation, by calling it *Polyphylla Melolontha*, literally the many-leaved Melolontha, in allusion to the unusual number of leaves in the knob of the antennæ. Mr. Hentz's species will then become *Polyphylla variolosa*.

[Insert after first paragraph on p. 83, 3d Ed.]

[**70**.] Another grain-weevil, hardly differing from the foregoing except in its color, which is black, is found in New York. It is the *Calandra* (*Sitophilus*) *remotepunctata* of Schönherr. Whether wheat, and other grain, suffers to any extent in this country from either of these weevils, I have not been able to ascertain, as the accounts given of the ravages of the insects supposed to be weevils are rarely accompanied by any descriptions of them in their different states.

[Insert after first paragraph on p. 116, 3d Ed.]

[**93**.] Mr. Say thought the foregoing to be the only species of *Rhagium* in the United States. There is, however, another one, closely allied in form to the willow Rhagium of Europe, which was obtained by Mr. Leonard in Dublin, N. H., and the same insect has been found in other parts of New England. It does not appear to have been described, and is the *Rhagium decoloratum* of my Catalogue, so named because the wing-covers appear discolored, as if their original hue had faded away. It is from eight tenths of an inch to one inch, or rather more, in length. It is proportionally longer and narrower than the ribbed Rhagium, and its antennæ are two thirds the length of the body; its wing-covers are smooth or not ribbed, and of a dirty brownish yellow or clay color; the rest of the body, the legs, and the antennæ, are reddish brown. It is possible that this may be only a variety of a species which has blue or blackish wing-covers; but all the specimens that have fallen under my observation are alike.

[Insert after first paragraph on p. 155, 3d Ed.]

[125.] In Europe there are found, in ant-hills, little jumping insects about three twentieths of an inch in length, of a brownish color, with an egg-shaped body, entirely destitute of wings and wing-covers. The head is very small, and nearly concealed under the forepart of the body; the hindmost thighs are remarkably thick; and the female has a very short piercer, not exceeding the terminal appendages in length. These insects belong to the genus *Myrmecophila.* Several years ago I observed that cucumber vines were much infested by some minute jumping insects, rather less than one tenth of an inch long, of a broad oval shape, and black color, without wing-covers or wings, but furnished with short thick hinder thighs. They injured the vines very much by eating holes into or puncturing the leaves, and were expelled by dusting the plants with flour of sulphur. These cucumber-skippers were so soft and tender, and withal so agile, that it was difficult to catch without crushing them. Consequently I was unable to examine them thoroughly, and failed to preserve specimens of them. It is possible that they may come near to the genus *Myrmecophila*, which was unknown to me at the time; and since then these minute insects have escaped my observation. They were very different from the little flea-beetles (*Haltica cucumeris* or *pubescens*), also found on cucumber-vines, which have already been noticed among the Coleopterous insects.

[Insert after first paragraph on p. 369, 3d Ed.]

[264.] In the early part of August another kind of tussock-moth is sometimes seen on fences or on the sides of buildings. Both sexes are winged, the females differing from the males only in being of a larger size, and in having antennæ which are not distinctly feathered. They are of a brownish gray color; their fore-wings are traversed by two zigzag brown lines, and these are crossed by a straight brown line running parallel to the inner margin, and there is a large pale spot near the middle of the front margin; on the top of the abdomen are two little tufts composed of black glittering scales. The wings expand from one inch and a half to two inches. These moths belong to the genus *Dasychira*, a word signifying thick hand, and applied to insects of this kind on account of the thick covering of hairs on their fore-legs. The present species seems to be the *leucophæa*, or brown and white tussock-moth, figured in Mr. Abbot's sumptuous work on the insects of Georgia. The caterpillar I have not seen; but in the figure of it, given by Mr. Abbot, it is represented of a greenish yellow color, clothed with yellow hairs on the sides, with four yellow brush-like tufts on the back, and two brownish pencils on the first, eleventh, and twelfth rings. It is said to live on the leaves of various kinds of oaks. The chrysalis is of a brownish color, is hairy, and has four oval spots covered with branny scales on the back.

The last of the tussock-moths to be described is of a very pale **[265]** straw-yellow color; the thorax and abdomen are very woolly, and the forewings are marked with a small black spot towards the tip, and several short crinkled black and brown lines on the middle; all the legs are very hairy, and the feet are black. Both sexes are provided with wings, expanding from one inch and a half to one inch and three quarters, or more. The females are invariably larger than the males, and their antennæ are not perceptibly feathered beneath, while those of the other sex are widely feathered in a double row, from one end to the other. The caterpillar, according to Mr. Abbot, is covered with brownish hairs, which rise gradually on each side to a ridge along the middle of the back, giving to it a shape like the roof of a house; the hairs grow in clusters, and are short and even at the ends as if sheared off to a uniform length, except those at the hinder extremity, which form a kind of bushy tail. It feeds on the Viburnum or hobble-bush, the sassafras, and the plum-tree. In the month of September it makes a small tough silken cocoon of an oval shape, having a flat circular lid at one end, and fastens it to the side of a twig. The moth does not come forth till the month of July in the following summer. It was named *opercularis* by Sir James E. Smith, from the operculum or lid of its cocoon. It agrees in several of its generical characters with the brown and golden tailed moths of Europe (*Liparis* or *Porthesia auriflua* and *chrysorrhœa*); but the caterpillar and cocoon are entirely different from those of the above named insects. On account of the short and squat form, and the little bushy tail of the caterpillar, and the thick woolly body and legs of the moth, I call it, *Lagoa*[1] *opercularis*, the rabbit tussock-moth.[2]

[The paragraph on pp. 270–1 of the 1st edition, giving various methods of destroying *Clisiocampa americana*, is entirely recast on pp. 374–5 of the 3d edition.]

[Insert after first paragraph on p. 423, 3d Ed.]

[306.] Here should be placed some insects belonging to Mr. Doubleday's proposed genus *Balia*, whose caterpillars strongly resemble those of *Cerura*, while the moths have most of the characters of the European genus *Stauropus* or *Harpya*. These insects, though not uncommon in the Middle and Southern States, have not yet been found in Massachusetts. They evidently lead, through *Harpya Ulmi* and *Milhauseri*, to the Notodontians called *unicornis* and *concinna*.

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[1] *Lagoa* comes from the Greek, and signifies of, or belonging to, a rabbit or hare.

[2] It is possible that this insect may be the *Bombyx Americana* of Fabricius.

[Insert after first paragraph on p. 431, 3d Ed.]

[313.] Mr. Abbot[1] found the caterpillars of the *ministra* on a species of *Andromeda*. He says that they also eat the leaves of several kinds of walnut and oak; that those which eat walnut leaves are always black, with white hairs; and when their food is of the oak that they are more yellow; but that he had not observed any material difference in the moths.

[Insert after second paragraph on p. 545, 3d Ed.]

[396.] Of this description are the galls called swamp-apples and cedar-apples. The former grow on the small twigs of the swamp-pink, or *Azalea viscosa;* they are irregular in shape, of a greenish white color, and fleshy consistence, like an apple, and are sometimes eaten, but are rather too astringent to be pleasant. Cedar-apples are found on the twigs of the red cedar (*Juniperus Virginiana*); in their unripe state they are large, irregular, and coarsely fringed lumps, of an orange color, and as soft as jelly; they afterwards shrink, become hard and **[397]** round, and the thick, fringe-like projections on their surface shorten, and take the appearance of leathery prickles. They have been given as a medicine to expel worms; and their efficacy, if they really have any, probably depends upon the resin and oil peculiar to the tree, which gives to the galls, even when dried, somewhat of a turpentine smell.

[1] See "Insects of Georgia," p. 161, pl. 81.

EXPLANATION OF PLATES.

PLATE I.

Fig. 1. Cynthia Cardui; larva about to change to chrysalis. *Harris.*
“ 2. Cynthia Cardui; chrysalis. *Harris.*
“ 3. Notodonta concinna; larva. *Harris.*
“ 4. Brephos hamadryas; imago. *Harris.*
“ 5. Seirodonta bilineata; larva. *Harris.*
“ 6. Notodonta sp., see p. 305; larva. *Harris.*
“ 7. Limacodes ephippiatus; imago. *Sonrel.*
“ 8. Limacodes ephippiatus; tarsi. *Sonrel.*
“ 9. Noctua sp., see p. 318; larva. *Harris.*
“ 10. Chœrocampa pampinatrix; larva. *Harris.*
“ 11. Mamestra persicariæ, var. americana; larva. *Harris.*
“ 12. Notodonta anguina; larva. *Harris.*

PLATE II.

Fig. 1. Papilio Troilus; larva. *Harris.*
“ 2. Notodonta ulmi; larva. *Harris.*
“ 3. Notodonta ulmi; larva. *Harris.*
“ 4. Pygæra ministra; larva. *Harris.*
“ 5. Euchætes egle; larva. *Harris.*
“ 6. Sphinx cinerea; larva. *Harris.*
“ 7. Limacodes sp., see p. 176; larva. *Sonrel.*
“ 8. Notodonta unicornis; larva. *Harris.*
“ 9. Dryocampa senatoria; larva. *Harris.*
“ 10. Limacodes ephippiatus; larva. *Sonrel.*
“ 11. Limacodes cippus; larva. *Harris.*
“ 12. Dryocampa stigma; larva. *Harris.*

PLATE III.

Fig. 1. Thyreus Abbotii; larva. *Harris.*
" 2. Acronycta americana; larva. *Harris.*
" 3. Clostera americana; larva. *Harris.*
" 4. Oiketicus coniferarum; imago. *Sonrel.*
" 5. Pericallia quercaria; larva. *Harris.*
" 6. Limacodes sp., see p. 176; larva enlarged. *Sonrel.*
" 7. Psephenus Lecontei; larva, upper and under side. *Clark.*
" 8. Limacodes scapha; larva. *Harris.*
" 9. Lophocampa maculata; larva. *Harris.*
" 10. Acronycta ulmi; larva. *Harris.*
" 11. Philampelus Achemon; larva. *Harris.*

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" 2. Elater oculatus; larva. *Harris.*
" 3. Elater oculatus; upper surface of head of larva. *Harris.*
" 4. Chremastocheilus castanea; imago. 4^a. Thorax of same. *Hentz.*
" 5. Chremastocheilus Hentzii; imago. 5^a. Thorax of same. *Hentz.*
" 6. Chremastocheilus Sayi; imago. 6^a. Thorax of same. *Hentz.*
" 7. Chremastocheilus Hentzii. 7^a, labrum; 7^b, posterior view of labium and mentum; 7^c, maxilla; 7^d, mandible; 7^e, antenna.
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" 10. Pieris oleracea; side view of chrysalis. *Harris.*
" 11. Pieris oleracea; back view of chrysalis. *Harris.*
" 12. Dryocampa senatoria; larva. *Harris.*
" 13. Acronycta pruni; larva. *Harris.*
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" 17. Attacus Polyphemus; larva. *Harris.*
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" 8, " 54. Mandibles of Uleiota dubius ? ♂ and ♀.
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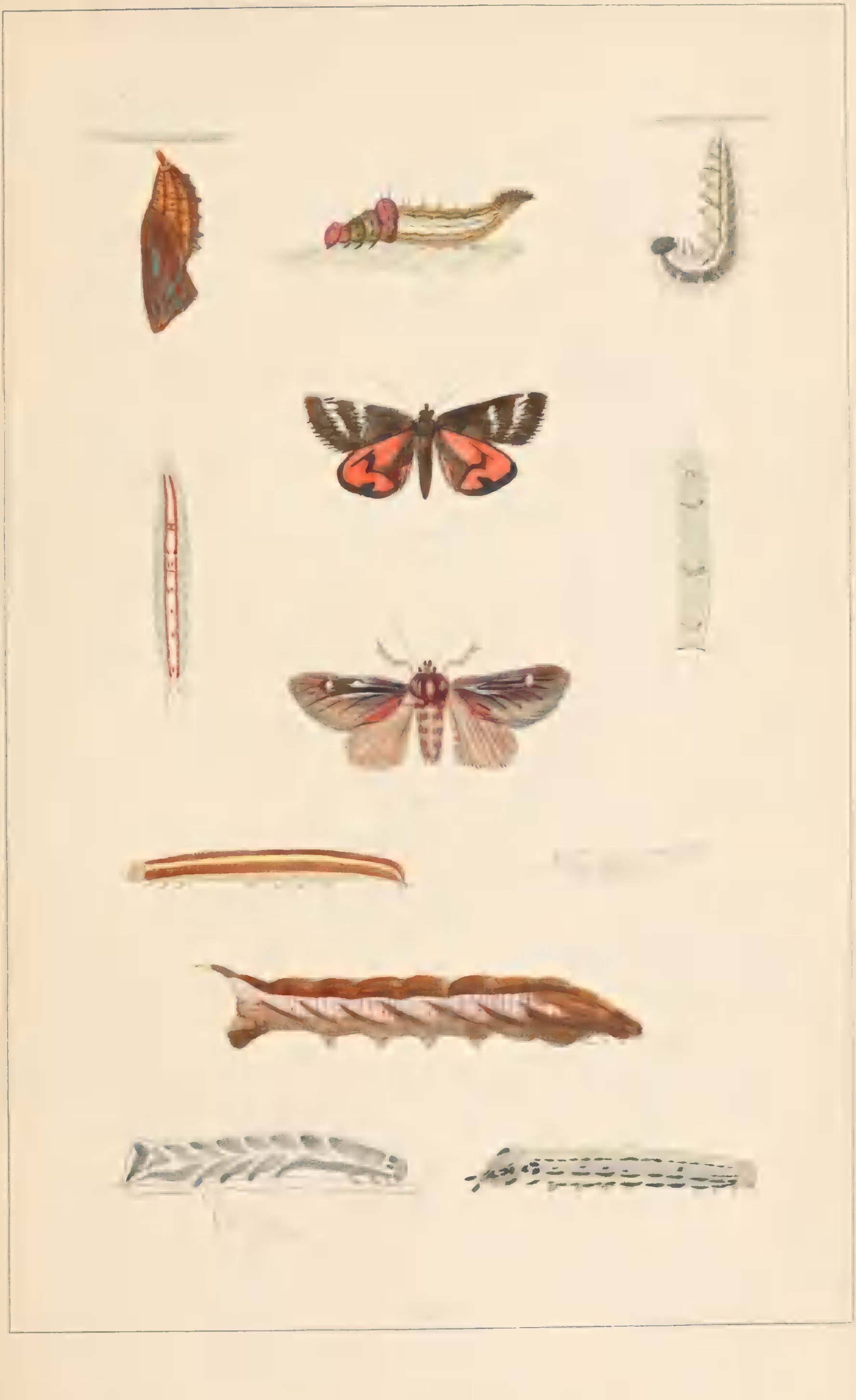
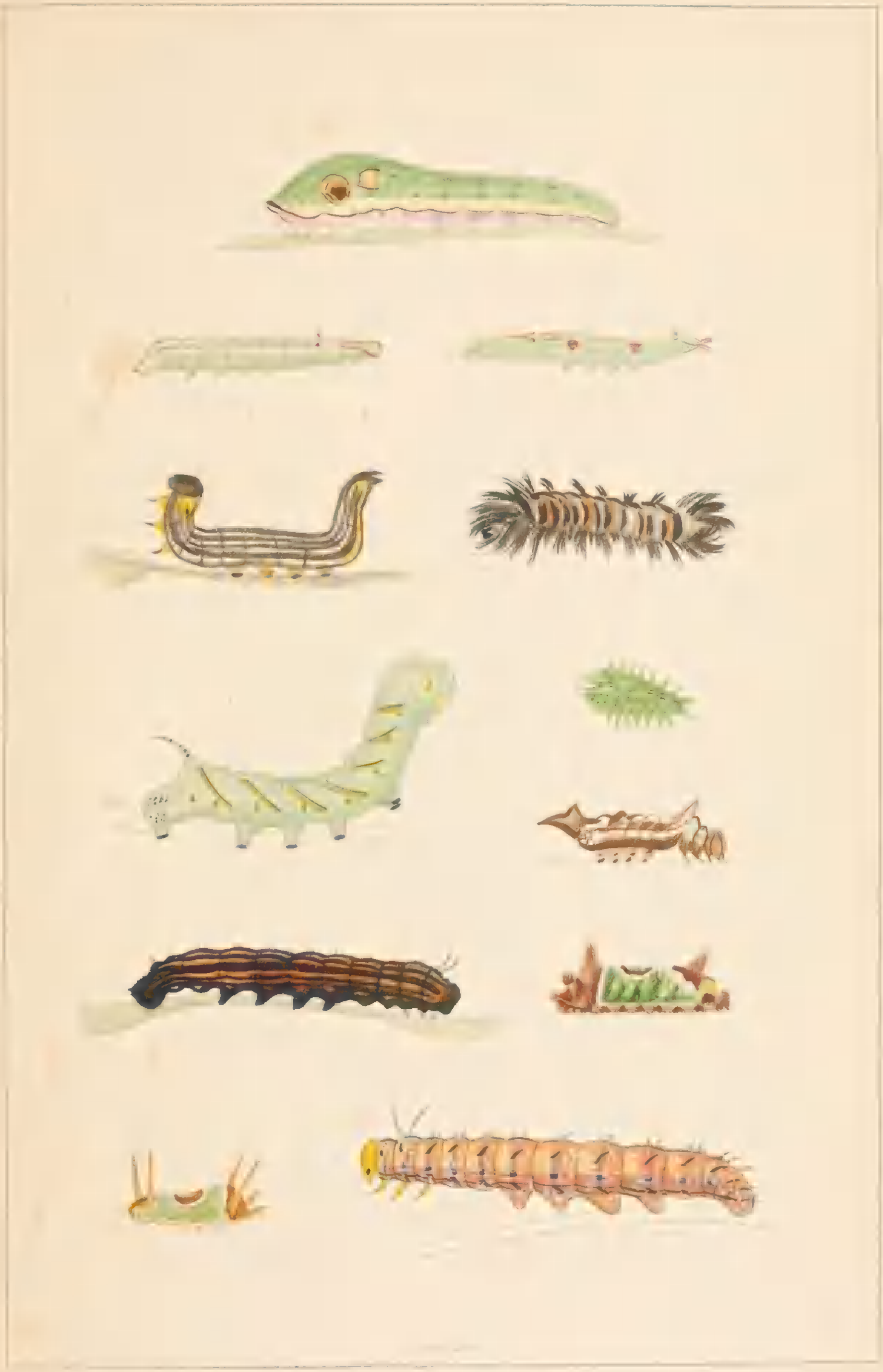
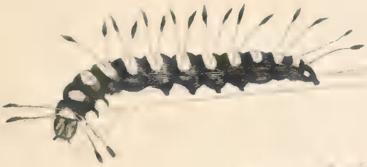
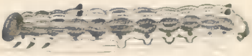
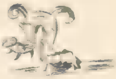
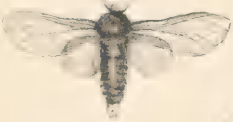


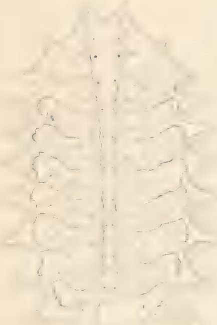


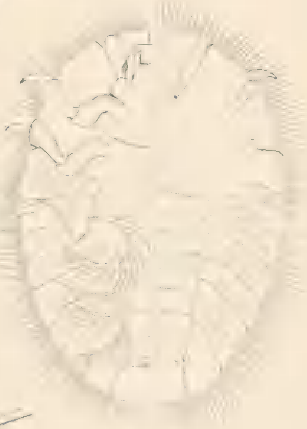












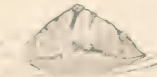
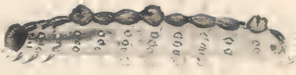
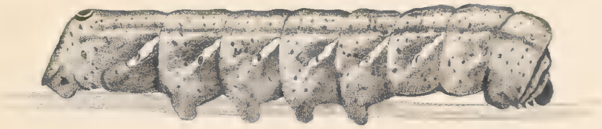
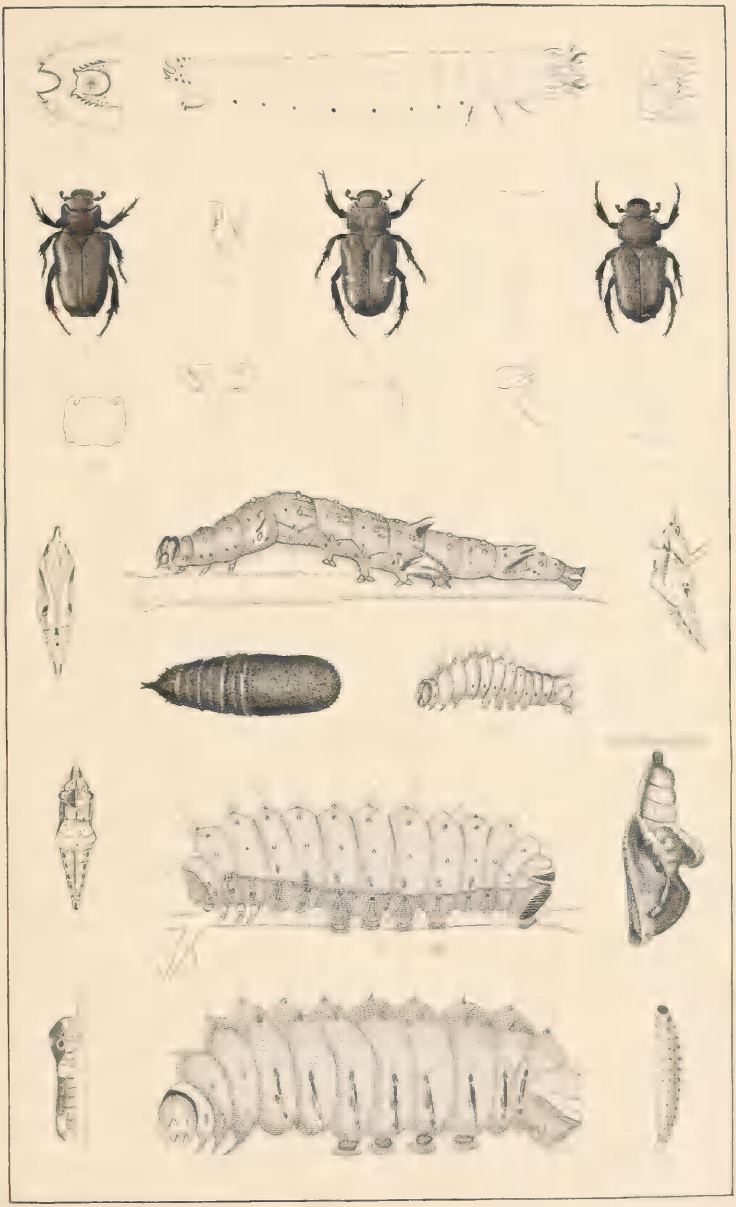


Fig 9







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